COMPUTERIZATION OF DRUG INFORMATION SYSTEM (A CASE STUDY OF GENERAL HOSPITAL, MINNA)

BY

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PGD/MCS/497/97

A PROJECT SUBMITTED TO THE DEPARTMENT OF MATHEMATICS/COMPUTER SCIENCE, SCHOOL OF SCIENCE AND SCIENCE EDUCATION OF THE FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF POST-GRADUATE DIPLOMA IN COMPUTER SCIENCE.

MARCH, 2000

CERTIFICATION

This is to certify to the best of my knowledge that this work has been carried out by me, ISAH, MOHAMMED ALFA under the supervision of MR. L. N. EZEAKO of the Department of Mathematics/Computer Science, Federal University of Technology, Minna.

_____ _____

MR. L. N. EZEAKO DATE

(PROJECT SUPERVISOR)

_____ _____

DR. S. A. REJU DATE

(HEAD OF DEPARTMENT)

_____ _____

EXTERNAL EXAMINER DATE

DEDICATION

This project is dedicated to my late father, Mallam Isah Musa,

May his soul rest in perfect peace [Amen].

ACKNOWLEDGEMENT

In the Name of Allah the Beneficient, the Merciful. All praise is due to Allah the Lord of all worlds.

My profound gratitude goes to my project supervisor Mr. L.N. Ezeako who despite his various schedules still find time to make constructive criticisms and most helpful contributions towards the successful completion of this project, may God, in His infinite mercies bless and continue to guide him [Amen].

My appreciation also goes to the Head of Department of Mathematics/Computer Science, of F.U.T., Minna, Dr. S.A. Reju and the entire staff of the department for the knowledge they impacted unto me during the course, I remain eternally grateful.

Thank you and God bless.

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ABSTRACT

The profoundity and enormity of knowledge of drugs and literatures available on these drugs make it virtually impossible for any individual health worker especially the busy clinicians to cover all the information published in different pharmacotherapeutic fields. For this reason World Health Organization (W.H.O.) highlighted the importance of establishing drug information in hospitals where health workers in various clinical disciplines could solicit for patient-related drug information that is well sorted, timely, updated, duly processed and evaluated by an objective source

General Hospital, Minna was the first in Niger State to meet the W.H.O. standard by establishing drug information center which is currently manually operated. The task before General Hospital, Minna is to design a computerized procedure for the drug information system. This task is precisely what this project has tackled using database management system.

CHAPTER ONE

1.0 BACKGROUND OF THE STUDY

1.1 INTRODUCTION

Studies in several countries of the world have noted that in the absence of an unbiased source of drug information services, Medical practitioners and indeed health workers in general will generally receive their drug information from pharmaceutical company promotions, many of which contain bias and misinformation on the uses, side effects and contraindication of the drugs.

The amount of knowledge in medicine is growing fast and this is also true for the literature available on drugs which increase in number and potency.It is virtually impossible for the individual health worker to cover all information published in different pharmacotherapeutic fields and a growing number of health workers in various clinical discipline have started to request patient-related drug information evaluated by an objective source. It was to meet this perceived need that the World Health Organisation (W.H.O.) highlighted the importance of establishing drug information center in hospitals world wide with the pharmacist and clinical pharmacologist as the custodian of such Centre.

1.1.1 Drugs Information Resources

In order to establish a drug information services, it is necessary to assess the entire environment including the available resources. These may

include documents, facilities and agencies and people. Documents mean Journals, textbooks, compendia, etc. Facilities and agencies include pharmaceutical manufacturers, the ministry of health, school of pharmacy, medical and pharmacy organisation and medical reference libraries, people include physicians, dentists, nurses, pharmacists and allied health personnel within the hospital setting. It is incumbent upon those who establish drug information services to learn not only what drug information service are available to them, but also how best to utilize those resources.

1.1.2 Sources of Drug Information

Source of drug information is mainly the drug literature, and basic to all drug literature is the publication of an observed event, a tested hypothesis, or a description of a chemical synthesis or Isolation. These primary publications contain the scientific data upon which knowledge is built. Periodical journals and patent literature are the most common formats for the primary literature. The primary literature is defined as a collection of original data. Secondary literature is represented by indexing and abstracting services which provide a retrospective rational approach to the primary literature. Tertiary literature includes publications such a textbooks, monographs, compendia of handbooks. These are less current and less numerous than the documents of primary literature, but they are often the first resources purchased for a drug information services. The following are examples of drug information literature.

Tertiary Literature

1. Texts on drug availability and identification such as "Pharmacological and Chemical Synonyms", the "Physicians Dest Reference" and other local directory.
2. Compendia, Monographs and handbooks. Such as "The list of the National Essential Drugs" or "national formulary" "The America Hospital formulary services" and "Martindale. The Extra pharmacopeia"
3. Pharmacology texts such as "The pharmacological Basis of Therapeutics"by Goodman and Gilman.
4. Texts on side effects and adverse reactions such as "Meyler's Side effects of Drugs"
5. Texts on toxicity such as "Clinical Toxicology of commercial products" and "Handbook of poisonings, Diagnosis and Treatments".
6. Texts on pharmaceutics and therapeutic compatibility such as "Drug interactions" and "Evaluation of Drug interactions"
7. Texts on Clinical Pharmacy such as "Clinical Pharmacy Handbook for patent counseling" and "Clinical Pharmacy and therapeutics.
8. Texts on diseases such as "Cecil-loeb Textbook of Medicine", "Current Therapy" and "The principles and practice of medicine"
9. Texts on diagnostic laboratory tests such as "Clinical Laboratory Medicine" and effects of Drugs on clinical Laboratory Test".

Secondary Literature:

1. "Adverse Reaction Titles" a publication by Excerpta Medica which indexes about 3500 biomedical journals in several languages.
2. "de Heen, Drugs in use" Provides excepts of studies concerning the efficacy, clinical pharmacology and toxicity of drugs in human from the international literature.
3. "Index Medicus" Index more than 2250 journals throughout the world covering a wide range of medical topics.
4. "International Pharmaceutical Abstracts" contains abstracts of articles appearing in 1000 international journals.

Primary Literature:

This should include Medical and Pharmaceutical Journals such as "The Lancet" "The New England Journal of Medicine" "Pharmanews" Nigeria Journal of Pharmacy, "The American Journal of Hospital Pharmacy" "Drug intelligence and clinical pharmacy" etc.

1.2 BRIEF ON GENERAL HOSPITAL, MINNA

General Hospital, Minna was established in 1962 as a secondary health institution with the sole objective of taking care of health need of the populace. Like any General Hospital in the world it was made up of vital departments and sections such as Medical Records, Laboratory, Pharmacy, Medical, Surgical, Obsteteries and Gynecology, Pediatrics, Outpatients,

wards, etc. In most cases the drug information unit is an extension of pharmacy department but at the time of establishments of this hospital there was no drug information unit, Until 1992 when the need became very obvious. General Hospital Minna at the beginning was a 100 bed capacity hospital, was later expanded to 150 bed capacity probably because of the population growth, the same hospital was expanded the second time in 1980 to 200 bed capacity hospital, merely five years after Minna became the state capital. This Hospital is headed by chief medical officer designated "Head of Hospital Service" (HHS), there is also the head of the administration designated "Hospital Secretary" All other departments are headed by the relevant professionals at the rank of either principal, Assistant Chief or Chief as the case may be. The hospital also undertake the practical training of House officers, intern pharmacists, students nurses and midwives and other allied health courses.

General Hospital, Minna is the only hospital in Niger State with it's own infusion plant (plant that produce infusion solutions) and perhaps the biggest of all the hospitals in the state. The hospital is fully operational with all the departments performing their specific jobs in promoting the health care need of the populace.

As mentioned earlier the need for the drug information unit only became obvious later, because at the time of establishment of this hospital there were relatively few drugs, some of which turned out to be unacceptably toxic. While it is now widely recognise that medicines should be defined as active

substances plus information both components being of equal importance this was not the case them. Other factors that necessitated drug information unit are:

- Drug Information has gone through the revolution in recent years. Both the quality and quantity have expanded dramatically, so that information is fast outstripping the ability of professionals to analyses and integrate.
- While new drugs are welcome, the additional numbers add to the challenges of patient care. Poor access to objective information compounds the problems, produces wasteful and irrational prescribing and an increase in the incidence of iatrogenic disease.
- While the biomedical literature makes it difficult for individuals to use it in practice. It is also a contradiction that some important data continue to be scarce for instance, adverse drug reactions are often under reported or unpublished.

It was in recognition of the above factors (problems) that the authorities observe with keen interest the need for drug information units that would shoulder the responsibilities of making available unbias and objective professional contents drug information from an authentic source that is duly processed. Hence, in 1992 the drug information unit was established in General Hospital, Minna.

Before establishing any drug information Centre or unit, consideration must be given to the geographical scope of coverage. Most drug information

centers provide either local or regional coverage, local meaning within the confines of one particular hospital, and regional meaning that coverage is made available to the surrounding area such as other hospitals in the area or region. In the case of General Hospital, Minna it is a local drug unit i.e. meant to serve only General Hospital, Minna.

Drug information Centre be it local or region has two problems to tackle, patient oriented and drug oriented.

These are defined as:

1. Patient-Oriented:- Consideration is given to a specific patient and his drug related problem e.g. adverse effect of a drug observed from a particular patent only.
2. Drug-Oriented:- Consideration is given to a specific drug and patients may or may not be involved, e.g. Adverse effect of a drug not having any particular patent in mind.

1.3 THE HOSPITAL SET-UP

In General, Hospital be it general, specialist or teaching is made up of four (4) distinct divisions such as:

1- Administrative division

(i) Personnel department

(ii) Accounting department

(iii Maintenance department

(iv) Landary department

2- Medical division

i. Medical department

ii. Surgical department

iii. Pediatrics department

iv. Obstetaries and Gynecology department

v. Laboratory department

vi. X-ray department

vii. Physiotherapy department

viii. Medical Records department

ix. Dental department

x. Nutrition department

xi. Ophthalmology department

etc.

3- Pharmacy division

i. Pharmacy department

ii. Others.

(a) Drug information unit

(b) Unit dose dispensing Unit

(c) Clinical Pharmacy Unit

etc.

4- Nursing division

i. Nursing department

ii. Others

(a) Mutuary Unit

(b) Ambulance Unit etc.

All the departments and units that forms the different division have their roles and functions defined and which form an integral part of the health care delivery. While the administrative division is bestow with the administrative procedure of the day to day running of hospital in terms of personnel recruitment, promotion, discipline and smooth running of the activities of the hospital, the medical division is responsible for the diagnosis, treatment and surgical operation of patents and also prescription of drugs. The pharmacy division is to compound and dispense the prescribed drugs and also to counsel patient on safe use of drugs. While the laboratory is to carry out diagnostic tests, the nursing division is to administer the prescribed and dispensed drugs to the patient at the required quantity and time especially in the wards.

Of recent the word "Division" often interchanged with "department" such that the use of division is gradually becoming outdated. Each department has a departmental head who naturally should be the most senior in that department.

The hospital management is made up of the central administration which ideally should be headed by executive or administrative Secretary while every

departmental head is a member of the management committee. In teaching and specialist hospitals the nomenclature has been charge to Chief Medical Director (CMD) which obviously gives only the medical officers the exclusive right to that post. The hospital secretary who is the head of the administrative department (division) is also the secretary of the management committee.

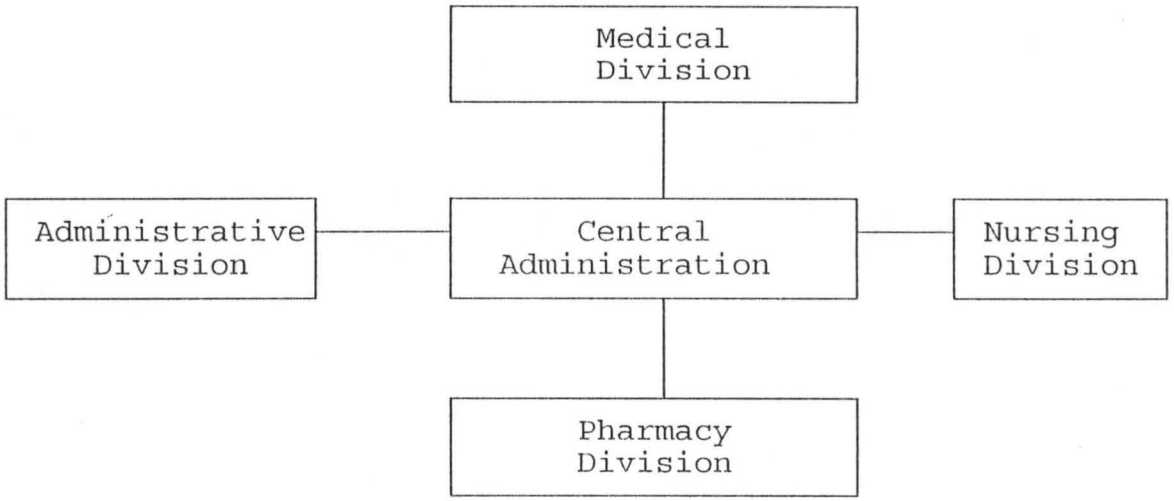

CHART 1: HOSPITAL SETUP

1.4 AIMS AND OBJECTIVES OF THE STUDY

This study is aimed at computerization of drug information system in General Hospital Minna; the computerization will facilitate steady retrieval of vital information which will promote the provision of much needed information database which focus on the origin, evaluation and dissemination of vital information relating to the utilization, hazard and characteristics of drugs, as a result, rational clinical use of drugs through the provision of objective, updated, timely, duly processed, pertinent and evaluated scientific and technical information will be promoted and ensured.

1.5 METHODOLOGY OF STUDY

There are several methods of gathering information. They include, observation, record searching, special purpose records, sampling, questionaires and interviewing. It is pertinent to mention here that the analysis approach to the investigation will influence the use of the various methods. In line with this, therefore, two (2) methods were employed in this study, record searching and observation.

1- Record Searching

The main purpose of record searching is to establish quantitative information, therefore all the available records, documents, forms, procedure manuals and source materials relevant to drug information in General Hospital Minna since inception were thoroughly searched to determine the volumes, frequencies and trends of questions received by the unit and answers provided.

2- Observation

This method involve watching an operation for a period to see for ourself exactly what happens. This method was employed in this study through the observation of practical demonstration of the procedures.

1.6 SCOPE AND LIMITATION OF STUDY

The realization that there are limitations of time, money and resources, requires careful selection of types of services offered and so this study considered four aspects of drug information services.

1- Professional content information on drugs for health care workers.

2- Feedback on "New facts" (uses and side effects) about existing drugs from health workers and patients to drug information experts.

3- Information on new drugs.

4- Schedule listing (Drug bullet)

As mentioned earlier, the geographical scope of this study is limited to the drug information system of General Hospital Minna.

CHAPTER TWO

2.0 ORIGIN OF DRUGS

2.1 HISTORICAL BACKGROUND OF DRUGS

A drug may be defined as an agent intended for use in the diagnosis, mitigation, treatment, cure, or prevention of disease in man or other animals. One of the most astonishing quality of drugs is the diversity of their actions and effects on the body.

Drugs in the form of vegetation and minerals, have existed longer than man himself. Human diseases and man's instinct to survive have, through the ages, led to their discovery. The use of drugs, crude though they may have been, undoubtedly dates back long period to recorded history, for the instinct of primitive man to relieve the pain of a wound by bathing it in cool water or by soothing it with a fresh leaf or protecting it with mud is within the realm of belief. From experience primitive man would learn that certain therapy was more effective than others, and from these beginnings, the practice of drug therapy began. Among many early races, disease was believed to be cause by the entrance of demons or evil spirits into the body. The treatment quite naturally involved ridding the body of the supernatural intruders. From the earliest records of history it is evident that the primary methods of doing so were through the use of spiritual incantations, the application of noisome materials, and the administration of specific herbs or plant.

Before the days of priest craft, the wise man or woman whose knowledge of the healing quality of plant had been gathered through experience or handed down by word or mouth was called upon to attend to the sick or wounded and prepare the remedy. It was in the preparation of medicinal materials that the act of apothecary originated. The act of apothecary has always been associated with the mystery and its practitioners were believed to have connection with the world of spirits and thus performed as intermediaries between the seen and the unseen. The belief that drug had magical association meant that its action, for good or for evil, did not depend upon its natural qualities alone. The compassion of a god, the observance of ceremonies, the absence of evil spirits, and the healing intent of the dispenser were individually and collectively needed to make the drug therapeutically effective. Throughout history the knowledge of drugs and their application to disease has always meant power, In the Homeric epics, the team PHARMAKON (Gr) connotes a charm or a drug that can be used for good or for evil purposes. Today it is obvious that many of apothecary's failure were due to impotent medicines, inappropriate medicines, underdosage, overdosage, and even poisoning, while the success may be attributed to an appropriate drug based on his experience, coincidence of proper therapy, inconsequential effect of the therapy for an individual with nonfatal illness. As time passed, the act of the apothecary became combined with priestly functions, and among the early civilizations the priest-magician or priest-physician became the healer of the body as well as the soul.

Due to the patience and intellect of the archeologist, the types and the specific drugs employed in the early history of drug therapy are not as indefinable as one might suspect. Many ancient tablets, scrolls and other relics dating as far back as 3000 B.C. have been uncovered and deciphered by archeolologic scholars to the delight of historians of drug therapy.

Throughout history many individuals have contributed to the advancement of the drug therapy and health science. Notable among those whose genius and creativeness had a revolutionary influence on the development of drug therapy were Hippocrates (460-377B.C.), Dioscorides (1st century A.D.), Gales (130-200 A.D.) and paracelsus (1493-1541 A.D.).

HIPPOCRATES was a Greek Physician who rationalised medicine and systematized the knowledge of drugs. His works included the descriptions of hundreds of drugs, and it was during this period that the term PAHRMAKON came to mean a purify remedy for good only, transcending the previous connotation of a charm or drug for good or for evil purpose. In recognition of his works, Hippocrates was honoured by being called the "Father of Medicine".

Dioscorides, a Greek physician and botanist was the first to deal with botany as an applied science of pharmacy. His work "DE MATERIA MEDICA", is considered a milestone in the study of naturally occurring medicinal materials, also his descriptions of the art of identifying and collecting natural drug products, the methods of there proper storage, and the means of detecting adulterants or contaminants were standards of the period.

Galen, a Greek pharmacist-physician who attained Roman Citizenship, aimed to create a perfect system of physiology, pathology, treatment and formulated doctrines that were followed for 1500 years. His works included the description of numerous drugs of natural origin (plant and animals) with a profussion of drug formulas and methods of compounding. He originated so many preparations of vegetable drugs by mixing or melts the individual ingredients, that area of pharmaceutical preparations has been commonly referred to as "Galenic Pharmacy".

Perhaps no man in history exercised such a revolutionary influence on drugs therapy as did Aureolus Philippus, a Swiss physician and chemist who called himself paracelsus. He influenced tremendously the transformation of pharmacy from a profession based primarily on botanic science (plant as source of drug only) to one based on chemical science (Chemical synthesis of drugs). He believed that it was possible to prepare a specific medicinal agent for use in combating each specific disease and introduced a host of chemical substances to drug therapy. Some of the formulas he derived, the names he coined, and the theories he advanced have remained a part of our daily therapy practice.

The process of drug discovery and development is complex. After a potentially new drug substance is discovered and has undergone definitive chemical and physical characterization a great deal of biological information must be gathered. The basic nature and mechanism of action of the drug on the biological system must be determined including toxicologic features;

Pharmacokinetic features, effective route of administration and also the short term and long term effects on various body cells, tissues and organs. All these features are documented in pharmacopea.

Certainly the vast array of effective medicinal agents available today represents one of man's greatest scientific accomplishments. It would be frightening to conceive of our civilization devoid of these remarkable and beneficial agents. Through there use, many of the diseases which have plagued mankind throughout history, as smallpox and poliomyelitis are now virtually extinct. Illnesses such as diabetics, hypertension and mental depression are now effectively controlled with modern drugs. Today's Surgical procedures would be virtually impossible without the benefit of general anesthetics, analgesics, antibiotics and intravenous fluids.

2.2 RELEVANCE OF DRUGS IN HEALTH CARE AND THE NEED FOR DRUG INFORMATION SYSTEM

2.2.1 Relevance of Drugs in Health Care

It is a fact that one of the greatest enemy of man is disease, it is equally true that the greatest hope of man against diseases are drugs, no wonder, one of the most distinguishing factors between man and other animal is the urge to take drugs when the need arises.

For users of health care services, the quality of curative care is the focus of attention, the overriding factor is the availability of drugs, without drugs health services definitely have an image of irrelevance. Historically, drugs

assume centre stage in the health care delivery services when Penicillin was first discovered in 1929 by Fleming.

While more than 90% of patients that visit hospitals world wide require drug therapy, the procedure in the laboratory, operating theatre and X - ray also required the use of drugs and chemicals; it is obvious then that only a negligible fraction or percentage of patient required other forms of therapy such as physiotherapy etc.

World Health Organisation (WHO) underscored the importance of drugs in health care delivery when it said "Drugs occupy the central position (Backbone) in the health care, as its availability gives credibility to the health care while it's absence is more than catasthrophy".

2.2.2 The Need for Drug Information System

There are a very large number of drug products available in the markets and each year many new drugs are introduced. New facts about existing drugs are also being discovered. It is impossible for busy clinicians to have a satisfactory knowledge of all these drugs. Infact, it may not be possible to remember all the clinically important details of even a limited range of drugs. Selection and use of the right drug in an appropriate manner (rational use of the drug), is thus a challenging and difficult task. There have been a rapid increase in the volume of information provided by drug companies about drugs, the quality of which need to be assured or authenticated. The identification of drugs given the proliferation of brand names, is often difficult and time consuming.

Given all these challenges, the health care workers particularly the clinician have stated to request patient - related drug information, that is evaluated by an objective source, hence the need for drug information system.

2.3 CLASSIFICATION OF DRUGS

Drugs are classified in multifarious dimensions, however, pharmacological classification is universally more acceptable. This classification is done in accordance with the actions exerted by the drugs, consequently, drugs are classified under this method into three (3) very brand categories viz:

1- ***PHARMACODYNAMIC AGENT***

These group of drugs exert their actions by modifying the tissue functions qualitatively, it does not change the principal activity or integrity of the tissue. Therefore the action of these group of drugs is either stimulating or depressive e.g. cimetidine.

2- ***REPLACEMENT AGENTS***

These are drugs that serve there action by replacing the deficit occurring in the body e.g. Insulin.

3- ***CHEMOTHERAPEUTIC AGENTS***

These are drugs that demonstrate their effect by killing or inhibiting the growth. They are toxic to parasites, bacteria or rapidly growing neoplastic tissues and harmless to host cells e.g. Anti-malarials, Antibiotics, etc.

(1) PHARMACODYNAMIC AGENTS

Under this category are several classes of drugs with specific reference to their actions. These classes include:

(A) Drugs acting on central Nervous System - In this class are the following groups:

(1) Hypnotics and Sedatives:- These are drugs that can induce a kind of physiological sleep e.g. Barbiturates, paraldelyde.

(2) General Aneasthetics - These are drugs which causes a rapidly reversible narcosis stage of brain resulting in the loss of pain, Unconsciousness and muscle relaxation e.g. Nitrous oxide, ketamide, etc.

(3) Nacortic Analgesics - These are drugs that may relief pain by reducing the ability of the patient to perceive the sensation, probably by increasing the pain threshold in the brain stem e.g. morphine, opiate, meperidine, methadone, etc.

(4) Anticourulsants e.g. Diazepam

(5) Anti psychotic agents - These drugs are used to reduce anxiety e.g. Imipramine, Dopamine, Caffiene, mescaline etc.

(B) Drugs Acting On Autonomic Nervous System - The following group are found in these class.

(1) Parasympathomimetic Agents:- Like the name implies, these drugs imitate the actions of parasympathetic. System as a result brings about salavation, reduce heart beat and also increase gastric secretion, etc e.g. choline esthers (Acetylcholine) Anti cholinesterare (Neostigmine)

(2) Parasymphatholytic Agents:- These are agents whose actions are in direct opposite of parasympathic. System, therefore they produce dry, month, reduced gastric secretion etc. e.g. Atropine, Scopolamine, Homatropine, etc.

(3) Sympathatomimetic Agents:- The function of sympathetic system which is synonymous to actions of sympathatomimetic agents is to prepare the body for action e.g. Norepinephrine, Levodopa, Ephedrine, Amphetamine, etc.

(4) Sympathelytic Agents:- These are drugs that antagonises the effect of sympathetic. System either by blocking adrenergic neuron or interfere with the synthesis of catecholamines e.g. phenoxy benzamine, piperoxan, Tolazoline.

(C) Drugs Acting on peripheral Nerve and Muscles - The groups in this class are:

(1) Local Aresthetics:- These are drugs that produce loss of sensation in a circumscribed area of the body without lost of consciousness e.g. cocaine, Butethamine, Lignocane etc.

(2) Skeletal Muscles Relaxants:- These drugs produces relaxation of skeletal muscles e.g. mephenesin, meprobamate etc.

(3) Myoneural Agents:- These are drugs that act at the myconeural endplate (between the motor nerve fibres and muscle fibres) e.g. Acetylcholic, Tubocurarine.

(D) Others - This consists of the following classes:

(1) Cardiovascular (heart) agent

(2) Drugs acting on the kidney

(3) Drugs acting on the gastrointestinal system

(4) Drugs acting on the uterus

(5) Endocrine drugs etc.

(2) ***REPLACEMENT AGENTS***

This category consists of the following classes:

(A) Electrolytes and Body Water - Our human body keeps a constant fluid volume and an electrolyte balance which are regulated by the daily intake and excretion. If there exist an imbalance, especially, a lost of electrolytes or body water, then replacement of such electrolytes or body water, is made to correct the imbalance e.g. Na^+ , K^+, Ca^{2+}, etc

(B) Vitamins - These are substances supplied from diatery sources in small quantities and are essential in maintaining normal health and growth. If the intake of one of the vitamins is inadequate, the deficiency leads to

the development of disease or impairment of certain selective tissues, to correct it vitamin replacement is done e.g. vitamin B_6, B_{12} vitamin C, vitamin A, etc.

(3) CHEMOTHERAPEUTIC AGENTS

A lot of classes of drugs fall into this category. They are

(A) Antibiotics:- These are drugs that inhibit the growth of bacteria (Bacteriostatic) or kill bacteria (Bacteriadal). There are many groups under this class

(1) Sulphonamides - e.g. Co-tamoxazole

(2) Penicilines e.g. Benzyl penicillin

(3) Cephalosposins - e.g. cefutaximine

(4) Tetracyclines - e.g. Doxycycline

(5) Aminoglycosides - e.g. Gentamian

(6) Chloramphenicol

etc.

(B) Anti viral agents - These class of drugs are used to kill virus e.g. Acyclovir, Amantadine, etc.

(C) Antimalaria agents - These drugs are used to kill malaria parasites and has the following groups:-

(1) 4 - Aminoquinolines e.g. chloroquine

(2) Biguanide e.g. Chloroguanide (paludine)

(3) 8 - Aminoquinolies e.g. primaquine

(4) Acridines e.g. Quinacrine

(5) Quinirus e.g. Camoquine

(D) Amebicides:- These are agents (drugs) used to kill protozoa called *Entemoeba histolytica* e.g. Metronidazole, etc.

(E) Anti Helmintics:- used for the treatment of worm infections e.g. piperazine, Thiabendazole, etc.

(F) Anti-Neoplastics:- These are drugs used against tumor cells or abnormal tissue cells e.g. melphalan, mechlorethamine, etc.

(G) Local Antiseptics and disinfectants:- This is used for topical application on the wound or surface of objects to kill bacteria and also to prevent contamination e.g. phenol, Formaldehyde, cresol etc.

(H) Pesticides - These are drugs used to destroy pests (destructive insects, rodents, small animals, weeds etc).

The following are the groups in this class:

(1) Insecticides e.g. Hexane

(2) Rodenticides e.g. Warfasin

(3) Herbicides e.g. Arsena.

(4) Fumigants e.g. Methylbromide.

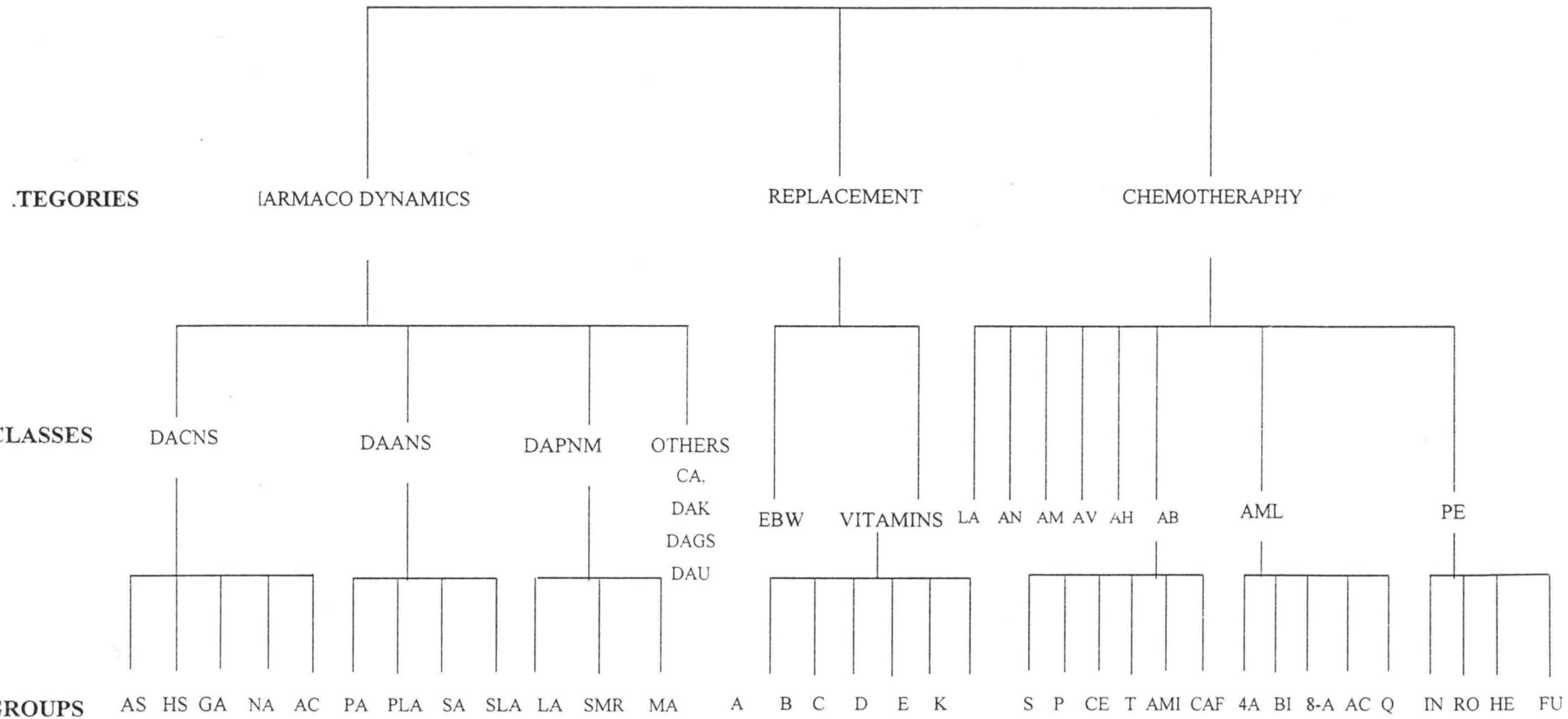

CHART 2: DRUG CLASSIFICATION CHART

INTERPRETATION OF ABBREVIATION

DACNS	-	Drugs Acting On central Nervouses System
DAANS	-	Drugs Acting On Autonomous Nervous System
DAPNM	-	Drugs Acting On Pheripheral Nerves and Muscles
CA	-	Cardiovascular Agents
DAK	-	Drugs Acting On the Kidney
DAGS	-	Drugs Acting On Gastrointestinal System
DAU	-	Drugs Acting on Uterus
EA	-	Endocrine drugs (Agents)
EBW	-	Etrolytes and body water
LA	-	Local Antiseptics
AN	-	Anti Neoplastics
AM	-	Amebicides
AV	-	Anti viral
AH	-	Anti Helmintis
AB	-	Antibiotics
AML	-	Antimalarials
PE	-	Pesticide
AS	-	Anti Psychotic Agents
HS	-	Hypnotics and Sedative
GA	-	General Anesthetics
NA	-	Narcotic Anelgesics
AC	-	Anti Convalsants

PA	-	Parasympathomimetic Agents
PLA	-	Parasympatholythic Agents
SA	-	Sympatholytic Agents
SLA	-	Sympathylytic Agents
LA	-	Local Anesthetics
SMR	-	Skeletal Muscle Relaxants
MA	-	Myeoneural Agents
A	-	Vitamin A
B	-	Vitamins B_6, B_{12}, B_2, etc
C	-	Vitamin c (Ascobic Acid)
D	-	Vitamin D (Calcifecol)
E	-	Vitamin E
K	-	Vitamin K
S	-	Sulphonamides
P	-	Penicilline
CE	-	Cephalosporis
AMI	-	Aminoglycosides
CAF	-	Chloramphenicol
4-A	-	4 - Amino quinolines
8-A	-	8 - Aminoquinolines
AC	-	Acridines
Q	-	Quinines
IN	-	Insecticide

DETAILED DATA (INPUT)
(phase 1)

↓

PROCESSING
(phase 2)
Classification and Sorting
Storage and Retrieval
Summarization
Analysis
Communication (Reporting)

↓

OUTPUT
(phrase 3)

Management information
Custodial processing
Historical records

Chart 3: The Data processing function as a 3-phase system

An important data processing concept is found in the system view of chart 3, namely that there is a difference between data and information. If there were no difference, not all the activities in phase 2 would be required. Classification and sorting, Summarization and analysis, would be superfluous. Data are raw facts from which information is created. Carefully examining Chart 3 indicates that information must be some sort of knowledge that is useful to managers in carrying out their planning and control functions, but the mere fact of its usefulness does not make such knowledge information. We therefore need a definition for information that will allow us to separate data from information in every instance. Such a definition must take in to account a further property

of information, it is presented (communicated) to its potential user in such a manner that it's usefulness is recognised by that user. Thus, information is a communicated knowledge expressed in a form that makes it immediately useful for decision making. Therefore information cannot be created unless the abilities and desire of the recipient come into play. The mere transmittal of relevant and timely facts is not enough. Unless those facts are accepted as basis for action, they are not information.

2.5 COMPUTER APPLICATION TO DRUG INFORMATION

Today we are truly witnessing a revolution in information handling techniques. Nearly everywhere, computers are at work processing data, digesting information, Sending out bills, inventory slips and paychecks and performing many other tasks. Each day, more and more computers are being installed and utilized throughout the world to provide an extra ordinary number of and variety of services. It is therefore not surprising that many enthusiasts think of information technology as a major organisational problem-solver, increasing organisation capacity to cope with external and internal complexities and improve their performance.

Drug information was once a relatively simple matter but with growing amount of drug products in the markets, it grow more complex as it becomes impossible for any individual to keep the knowledge about all the drugs in memory. The advent of sophisticated and efficient computers finally provided tools that could adequately control and manage the burgeoning amount of drug

information available, this is because the memory capacity of the computer to hold these information is not doubtful whereas the speed of retrieval of such information is amazingly fast, the quality of the information is neither adulterated nor threaten.

CHAPTER THREE

3.0 SYSTEM ANALYSIS AND DESIGN

3.1 REQUIREMENTS OF DRUG INFORMATION SYSTEM

This is the analysis of each component (sub system) of drug information system based on the old system.

3.1.1 Professional Content Information on Drugs

This is defined as detailed information on drugs otherwise called MONOGRAPH. Usually the information is in medical terms and strickly for consumption of the health care workers only.

The elements of Monograph are :-

Name - The Universally accepted drug names are those names that were scientifically coiled and are called GENERIC NAMES. Trade names are not universally accepted, e.g. Paracetamol and not Panadol (R).

Class - The class the drug belong e.g. Antimalarial, Antibiotics etc.

Indication - The disease conditions in which the drug could be used i.e. uses of the drug e.g. Chloroquine is indicated in the treatment of malaria fever.

Dose	-	This is the quantity of the drug to be taken at a time, the frequency i.e. how many times in a day and the duration i.e. how long the drug is to be taken. Doses are age and disease condition dependent. e.g. Cap Ampicillin; Dose :- 500mg to be taken four times in a day for five days.
Side effect	-	Other effects (Unpleasant) of the drug which are not desired.
Contra-Indication	-	Conditions where the drug must not be used either because of its fatal consequence or it may exacerbate the patient condition
Precaution	-	This is where the use of a drug or combination of drugs must be made only after careful consideration of the benefit and the risk.
Pharmacokinetics	-	This has to do with absorption and fate of the drug in the body. How the drug is absorbed into the blood stream, bioavailability i.e. the minimum concentration of the drug required in the blood to elicit the desired therapeutic effect, how long it stay in the site of action before it is metabolised, metabolic pathway and subsequent elimination of the drug in the body.
Poisoning	-	Where accidental overdose occur, adverse effects might manifest in the form of sign and symptoms

HOW THIS COMPONENT (SUB SYSTEM) OF DRUG INFORMATION IS OPERATED IN GENERAL HOSPITAL MINNA

Most of the requests for information are made by telephone or personal contact to the clinical pharmacologist or pharmacist on duty. A manual literature search is made and information from available sources is evaluated. A preliminary telephone answer is given if urgently needed and a referenced handwritten answer is sent to the requester after internal review at a weekly staff meeting. All answers are written in duplicate , Signed by the respondent and countersigned by a senior pharmacist who takes full professional responsibility when the author is a junior pharmacist. The duplicate answer together with a check list of literature sources, is used for documentation.

RESULTS OF RECORD SEARCHING OF THE DRUGS INFORMATION UNIT OF GENERAL HOSPITAL MINNA

Record searching method has made it possible to obtain the pattern of questions received by the unit. In 1998 alone the unit treated five hundred and thirty six (536) questions bothering on professional content information on drugs. See the table below:

	Topic	Number	Percentage
1.	Side effects	198	37
2.	Pharmacokinetic	27	5
3.	Interactions	38	7
4.	Indication	38	7
5.	Pharmaceuticas	43	8
6.	Literature	64	12
7.	Pregnancy	107	20
8.	Nursing	21	4

TABLE 1: Distribution of topics for the questions 1998 (n = 536)

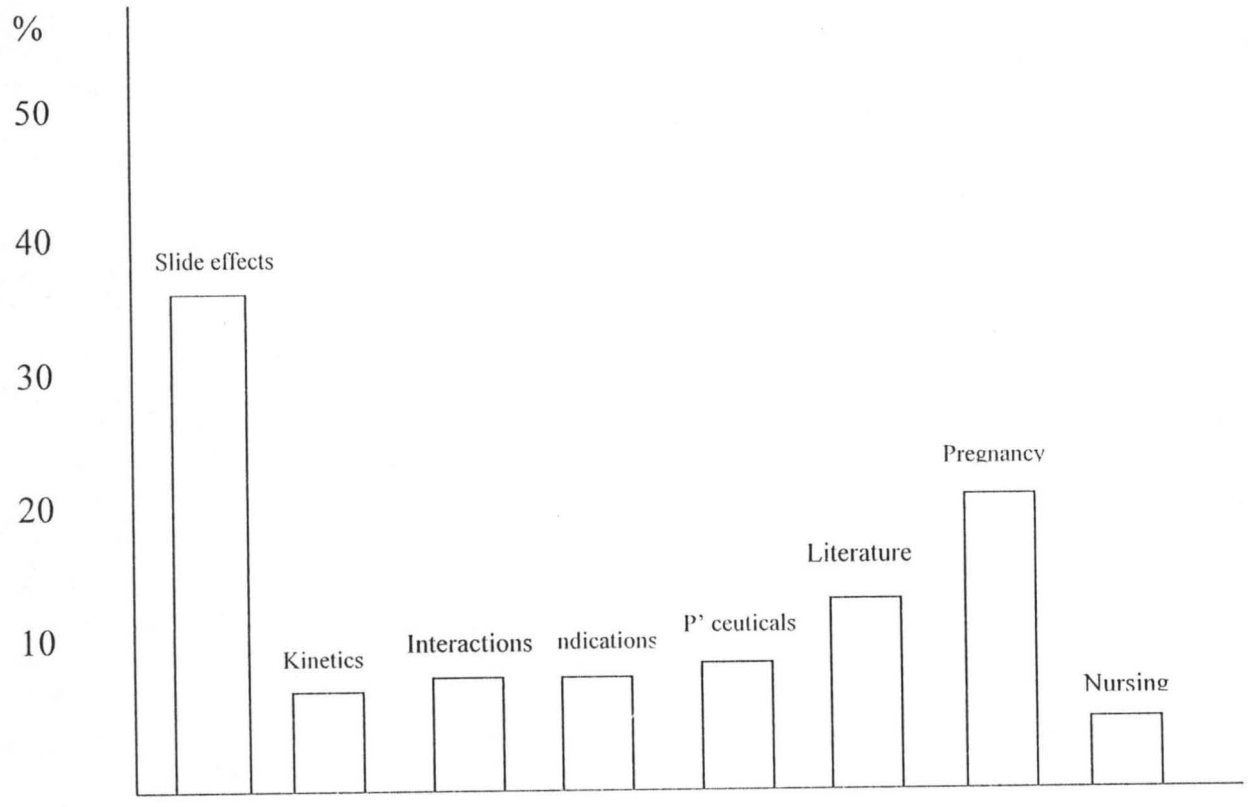

Chart 4: Bar chart showing the pattern of distribution of topics for the questions 1998 (n = 536)

3.1.2 FEEDBACK ON NEW FACTS (USES AND SIDE EFFECTS) ABOUT EXISTING DRUGS

Mostly emphasis is laid more on the adverse effects (side effects) that are new to the usage of the drug. The process is such that either a patient or health worker could walk into the drug information unit and give details of his/her experience after the patient particulars must have been noted i.e. Name of patient, Hospital Number, Name of drug - preferably Brand Name and a description of unpleasant effect. This would be documented, if such effect is reported a third time, then it is high lighted in the drug bulletin to inform the health workers of the need for great caution in the use of the drug while a report is sent to National Agency for food and drug. Administration and control (NAFDAC).

In the history of the drug information unit of General Hospital, Minna, only one case has been reported and which was pursued to the later. The drug "Trancopal" produced by stealing health is used to induce sleep, it was later discovered to have a severe diaphram contraction as an adverse effect. This was made known to the health workers of the hospital while the report sent to NAFDAC prompted an investigation that led to the withdrawal of the drug in the market.

3.1.3 INFORMATION ABOUT A NEW DRUG

Information about a new drug is usually a Monograph of the drug with all the necessary details, the source of which is the primary literature i.e. a publication of an observed event or tested hypothesis from the collection of

original data. Once the information is evaluated and authenticated, it is then pass onto the health workers through drug bulletin. Since the health workers must keep abreast with happenings in the world of health, ofter the information about a new drug reached them many months or years before the drug become available for use.

In the history of the drug information unit of General Hospital Minna, there has been no report of a new drug published in the drug bulletin.

3.1.4 SCHEDULE LISTING (DRUG BULLETIN)

This is defined as a monthly or quarterly information publication about drugs which serve as a continuining education through information dissemination. The following are contain in a drug bulletin:-

- Drug Review - Complete review of medical and pharmaceutical literature on specific drugs or drug classes.
- Announcements - Information about a new drug, drug recalls etc
- Drug use problems as noted in the literature such as new side effects bioavailability data, special warnings, new methods of administration.
- Report on adverse drug reactions observed in the hospital
- A sample of the drug information inquiries which have been received during the past month by the Drug Information unit.

A search into the records of the drug information unit, General Hospital Minna shows that no drug bulletin has been produce from inception, the reason being obvious, the manual production of drug bulletin is indeed cumbeson.

3.2 SYSTEMS DESIGN

The proposed system will be designed to be users friendly. In this case, the design will be an integrated system whereby a menu structure will be displayed. The menu will represent various tasks and operations that can be performed with the System. In addition the mode of interaction by the user will also be provided at various points of interacting with the system.

Basically, the design will be a dialog system in which various options will be presented to the users from which a selection will be made; after the selection an appropriate action will be activated from which the user present the required information.

The design of the proposed system also required the design of the input and output. The input being the data to be supplied into the system and is to be presented in a form format which will be required mainly for data entry. The output, on the other hand, communicates the result of the operation to the users. The output of the prepared system, which is mainly hard copy, is to be presented in the form of a well detailed report.

3.3 PROJECT FEASIBILITY TESTING

Testing a Project feasibility allows for confirming the possibility of implementing the system. The yardstick of ascertaining the project feasibility are:

- Operational feasibility
- Technical feasibility
- Economical feasibility

OPERATIONAL FEASIBILITY

The operational feasibility is the test to confirm the working of a new system. However, the described computerised system is anticipated to work given the software to be designed, the hardware to be procured and the human ware to manage the system. All would be effectively combined for efficiency.

TECHNICAL FEASIBILITY

This is a test to confirm whether the existing equipment, software and the available personnel can be used for the proposed system. From the analysis above, the existing system is manually operated, this implies that the required equipment have to be procured and after the completion of the software design as required by this study, a computer training would be conducted in order to educate the potential users.

ECONOMICAL FEASIBILITY

This is a test to assess the cost of implementing a proposed project vis-a-vis the benefit to be derived. Given the importance of this, a section below (Chapter 4) is set to discuss the cost and benefit of the system.

3.4 INPUT SPECIFICATION

From the analysis specified above, the proposed system requires five(5) forms for data entry. The forms are to be used to accept information from the users on the following:

i. New drug

ii. Drug classes

iii. Drug indications

iv. Feedback operation

v. Drugline Entries

NEW DRUG:

This covers information about a newly introduced drug. It contains information such as name of drug, class of drug, indication of drug, side effects etc.

DRUG CLASSES:

Drugs are generally classified into various classes. The classification is used for identification and likely importance. This information becomes important because of the use of coding system in the software design whereby each class of drug is assigned a code.

DRUG INDICATIONS:

This states where the drug could be useful i.e. disease conditions the drug could be used for. For the purpose of group identification of drugs in terms of ailment, the drug indication is also coded such that each indication is assigned a code for the purpose of identification and error of data entry.

FEEDBACK OPERATION

New facts about existing drugs are often discovered, these new facts might be on usefulness or side effects. This information is expected to be supplied into the system for the purpose of drug update. A feedback operation form is designed to contain appropriate information on the facts discovered.

DRUG LINE ENTRIES

Experience over the years has shown that certain queries tend to be frequently posed and that answers to earlier consultation can therefore prove useful and save time. In other to benefit to maximum from earlier work, a database called Drugline has to be created. For purpose of data entry into this database file, a drugline form is required.

3.5 OUTPUT SPECIFICATIONS

There are various reports that are required to be generated by the new system. These are both the soft copy and the hard copy reports. These reports are listed below:

i. Drugline report

ii. Drug usefulness report

iii. Drug disease report

iv. Feedback report

DRUGLINE

This is the report that displays the content of the DRUGLINE database. It contains information such as the name of drug, the enquiry made on the drug and the response to the enquiry.

DRUG USEFULNESS REPORT

Some drugs are designed to be used for various diseases. Regularly, comprehensive information about the available drugs are required for reference purpose by the health workers. In this connection, a drug usefulness report contains information about the various uses of a drug.

DRUG DISEASE REPORT

In a disease condition more than one drug could be useful in the treatment i.e. many drugs could be used independently in the treatment of a particular disease, though these drugs have varying side effects. A comprehensive information about drug use in the treatment of a particular disease condition is contained in this report. This report becomes important for the sake of consultation by the health workers.

FEEDBACK REPORT

This is a report that display all the new facts (especially side effects) about existing drug. This report is usually prepared for onward transmission to national agency for food and drug administration and control (NAFDAC).

3.6 FILE DESIGN

In DBMS environment a database file is required for the sake of data storage. In this connection, the proposed system requires Six (6) database files for operational efficiency. The files are listed below.

i. DRUG.DBF

ii. CLASS.DBF

iii. INDICATE.DBF

iv. DRUGLINE.DBF

v. USES.DBF

vi. FEEDBACK.DBF

DRUG. DBF

This is a file that contains various information about each drug. The structure of the file is as shown below:

S/NO	FIELD NAME	TYPE	WIDTH	DEC.	INDEX
1.	DCODE	CHARACTER	8		N
2.	DNAME	CHARACTER	20		N
3.	DCLASS	CHARACTER	30		N
4.	DGRP	CHARACTER	50		N
5.	DINDC	CHARACTER	50		N
6.	DOSE	CHARACTER	50		N
7.	SIDE1	CHARACTER	50		N
8.	SIDE2	CHARACTER	50		N
9.	CONTRA	CHARACTER	50		N
10.	CAUTION	CHARACTER	50		N
11.	KINET	CHARACTER	50		N
12.	POISON	CHARACTER	50		N

CLASS.DBF

This is a reference file which allows for the application of the coding system. It contains the drug name and their respective classes. The structure of the file is as follows:

S/NO	FIELD NAME	TYPE	WIDTH	DEC.	INDEX
1.	CLASS	CHARACTER	3		N
2.	DESCR	CHARACTER	30		N

INDICATE.DBF

This is the file that contains the various indications of drug. The structure of the file is as shown below:

S/NO	FIELD NAME	TYPE	WIDTH	DEC.	INDEX
1.	DCODE	CHARACTER	8		N
2.	DNAME	CHARACTER	20		N
3.	UCODE	CHARACTER	7		N
4.	UDESCR	CHARACTER	20		N
5.	DOSE	CHARACTER	20		N

DRUGLINE.DBF

The drugline is a database file that contains information about questions and response of all enquiries made earlier. The structure is as shown below:

S/NO	FIELD NAME	TYPE	WIDTH	DEC	INDEX
1.	DCODE	CHARACTER	8		N
2.	DNAME	CHARACTER	20		N
3.	QSN	CHARACTER	6		N
4.	QDATE	DATE	8		N
5.	ENQ1	CHARACTER	50		N
6.	ENQ2	CHARACTER	50		N
7.	RESP1	CHARACTER	50		N
8.	RESP2	CHARACTER	50		N
9.	RESP3	CHARACTER	50		N
10.	SOURCE	CHARACTER	40		N
11.	RESEARCH	CHARACTER	40		N

USES.DBF

This file indicates the various drugs and their associated usefulness. It's structure is as shown below:

S/NO	FIELD NAME	TYPE	WIDTH	DEC.	INDEX
1.	UCODE	CHARACTER	7		N
2.	UDESCR	CHARACTER	20		N

FEEDBACK.DBF

This is one file that contains facts especially the side effect of a drug which is strange or new. In this case, the necessary details about the

information is entered into the database file. The structure of the file is as shown below:

S/NO	FIELD NAME	TYPE	WIDTH	DEC	INDEX
1.	HPNO	CHARACTER	9		N
2.	DATE	DATE	8		N
3.	NAME	CHARACTER	30		N
4.	SEX	CHARACTER	1		N
5.	AGE	CHARACTER	2		N
6.	LOCATE	CHARACTER	4		N
7.	DIAG	CHARACTER	30		N
8.	DNAME	CHARACTER	30		N
9.	ROUTE	CHARACTER	10		N
10.	DATEB	DATE	8		N
11.	DOSAGE	CHARACTER	15		N
12.	FREQ	CHARACTER	10		N
13.	USE	CHARACTER	30		N
14.	ADVERSE	Character	50		N
15.	DATER	Date	8		N
16.	RESP	Character	20		N

3.7 CHOICE OF SOFTWARE

For purpose of feasibility, the proposed system will be designed using Database Management System (DBMS). A DBMS is a software that maintain and manipulate the content of a database. It also provide the interface between the user and the data in such a way that it enables the user to record, organise, extract, summarise and report on the data contained in a data base. However, a database can be defined as a mechanised shared and centrally controlled collection of data used in an organisation. It is regarded as a collection of useful information organised in a systematic and consistent manner. A database can also be regard as a databank.

The use of DBMS in a software development requires database files as a means of data storage. In this case, the data in the file are organised into rows and columns with each row making up a record while columns represent fields in database file.

3.8 OBJECTIVES OF DBMS

The overall objectives for development of a database technology is to treat data as an organisational resource and as an integrated whole. DBMS allows data to be protected and organised separately from other resources (e.g. hardware, software and program)

In order to achieve these objectives, the database technology was designed with the following features:

1. *DATA CO-ORDINATION AND ACCESSIBILITY*

In a database environment, information from several files is co-ordinated, accessed and operated upon as if they are contained in a single file. In this way, database technology allows for logical centralization of information even thought, the data may be physically located on different devices. The user therefore, gain valuable information by linking data across the organisation.

2. *DATA ELIMINATION*

Data redundancy is the duplication of similar data in different files. This duplication leads to wastage of storage space and duplication of efforts during data entry and modification. The basic features of DBMS in this regard is that it does not allow for duplication of data storage. In order to achieve this, the technology requires the use of data modelling tools such as normalization and courting techniques.

3. *DATA INDEPENDENCE*

With the introduction of database technology, software development requires data to be separated from the application program. This feature of DBMS enables the users to modify the application program without necessarily changing the data and vice versa.

4. *MAINTENANCE OF DATA INTEGRITY*

Data redundancy can lead to lack of data integrity and a common feature of this is inconsistent information. This means that the information generated by the data processing system would no longer be trusted. However, since the database technology does not allow for data duplication, the possibility of having different entries for similar data is completely removed. Hence, the practice ensures the integrity of data.

5. *CENTRAL COLLECTION AND CONTROL OF DATA*

This is an important feature of DBMS. In database environment, data and operations on data are centrally controlled. This leads to better management of data because it allows for proper security of information stored.

3.9 PROGRAM DOCUMENTATION

The source program is designed using the concept of modular programming in order to reduce the complexity of the design. The new system has about 20 sub-programs which are integrated with a main program which co-ordinate the sub-programs. The program listing of the source program is contained in Appendix II.

CHAPTER FOUR

4.0 SYSTEMS IMPLEMENTATION

4.1 INTRODUCTION

The implementation of the new system is the stage that requires putting into use the newly designed system. For the purpose of continuity, the implementation is to be done after proper procedures that will ascertain the proper workings of the system and a mode of conversion that would not affect the proper workings of the organisation.

4.2 COMPUTER HARDWARE SPECIFICATION

The new system is designed to work on an efficient stand alone micro-computer system. Specifically, the computer hardware configuration should include a Micro-computer, Printer, and an Uninterrupted Power Supply (UPS).

The description and capacity of each are as stated below:

i. COMPUTER HARDWARE

A top of the range Micro-computer of an high configuration is recommended for the purpose of effective usage of the newly designed system. This is also required in order to meet the future needs of the organisation. The configuration of the computer should not be less than the configuration below.

Pentium 300 Mhz

64MB RAM

6.4GB Hard Disk

3.5" Disk Drive

40X CD-ROM

SVGA Monitor

Windows 98 Keyboard

Mouse + Mouse Pad

Software pre-installed.

ii. PRINTER

For the purpose of generating hard copy reports, a computer printer is required to be permanently connected to the system. In this vein, a quality printer which can serve the requirement of the organisation is needed. Specifically, LaserJet printer is recommended. The printer is to be used directly with the software for the generation of the required reports as well as other reports that would be required in the organisation, especially with the use of application packages to be installed. The recommended model of the printer is LaserJet 1100.

iii. UPS

The UPS is a facility that will ensure constant power supply to the computer and its peripherals incase of an unexpected power failure. It is

expected to have the capability for automatic provision of power for the sustenance of the computer system if there is a sudden power failure so as to allow for job continuity. The recommended UPS is APC Back-up Pro 1.4KVA with the capability of holding power for up to 45 minutes.

4.3 SOFTWARE REQUIREMENT

The new system will require the installation of some software for the purpose of its proper execution. In this vein, dBASE IV and Clipper (Version 5.3) are required to be installed for the sake of execution and future modification of the new software. The developed source program would required dBASE IV for modification and expansion while Clipper is needed for the purpose of compilation once a modification is carried out on the system.

However, the newly designed program can be executed in DOS and Windows environment. In this vein, it is recommended that DOS 7.0 and Windows '98 are to be installed.

In addition, for other areas of computer application, a WordProcessing Package is required for text processing and report preparation, a Spreadsheet Package for calculation and graph/data representation and a Desktop Publishing Package for designing letter headed paper, memo paper and other graphical representations.

Summarily, the required software are:

* dBASE IV
* Clipper Version 5.3

* MS-DOS 7.0
* Windows '98
* Word '97
* Excel '97
* Power Point '97

4.3 SYSTEM TESTING

The new system has been tested and confirmed working in accordance with its requirement. A test-run was conducted which involve some data entry. In the test analysis, the data were used to execute the various menus and submenus available in the software. The various results displayed were discovered to be correct and in order. These results are contained in the appendix. With this belief and assurance, it was confirmed that the software is working perfectly and as required.

4.4 CHANGE-OVER PROCEDURE

This involves file conversion, file set-up and changeover. File conversion requires changing the old (existing) system files to the format and content required by the new system. File set-up is the process of setting up the converted files on the computer. Changeover is the full replacement of the old procedure by the new one.

For the purpose of conversion from the existing system to the newly designed system, File Set-up and Changeover are required with the exception

of File Conversion. This is because the existing system is not a computer-based system, and as such, file conversion would not be applicable.

However, the changeover can be performed in any of the following three forms:

i. Parallel Changeover.

ii. Direct Changeover

iii. Pilot Changeover

Each of these is discussed in turn as follows:

Parallel Changeover

This requires the old and new system to run concurrently for some time using the same inputs. The output of the two systems are compared. This will continue until the new system is confirmed to be working satisfactorily.

Direct Changeover

This method is the complete replacement of the old system by the new system in one move. It is a bold move which should be undertaken only when everyone concerned has confidence in the new system.

Pilot Changeover

This is similar in concept to parallel changeover, it requires changing to the new system on a piece meals.

Given the above description of the various forms of changeover, a parallel changeover method is to be used for conversion. This is chosen mainly because

of its reliability and continuity of the operations. In this conversion technique, the old and new systems are in operation for a short while in order to make possible the comparison of their performance and effectiveness.

4.5 STARTING THE SYSTEM

Given that the necessary files have been established in the computer, the system can be started by taking the following steps:

* Type CD\DIS + <ENTER> Key
* Type DIS + <ENTER> Key

The execution of the above steps allows the first level menu (Main menu) appear on the screen from which the user would select an appropriate choice.

4.6 DESCRIPTION OF THE SYSTEM MENU

The first level menu consists of five options as displayed in Figure 1 in the Appendix. Each of this is itemised and discussed as follows:

* Drug Information Management
* Drug Enquiry System
* Drug Information Update
* Reports Generation
* Exit.

DRUG INFORMATION MANAGEMENT

This option contains five sub-options as displayed in Figure II used to manipulate the content of the master file i.e. DRUG.DBF. The sub-options are Drug Data Entry for adding drug record, Drug Data Modification for editing drug record, Drug Data Display for displaying drug record, Drug Data Deletion for deleting drug record and Return to Main Menu for moving out of the sub-option. The screen design for each of these is represented by Figures III – X in the Appendix.

DRUG ENQUIRY SYSTEM

This option contains four sub-options as displayed in Figure XI used for enquiry. The sub-options are Drug Usefulness Enquiry used to display the various usefulness of drugs, Drug Disease Enquiry for displaying various drugs that can be used for a specified disease, Drug Line Enquiry for the purpose of inquiring information from the drugline database and Return to Main Menu for moving out of the sub-option. The screen format for each of these are contained in Figures XII – XIV.

DRUG INFORMATION UPDATE

This option contains five sub-options as displayed in Figure XV used for updating various data files used by the system. The sub-options are Drug Class Update, Drug Indication Update, Drugline Update and Feedback Update used to update the files in terms of class, indication, drugline and feedback respectively

The last option, Return to Main Menu is used for moving out of the sub-option. The screen format for each of these are contained in Figures XVI – XIX.

REPORTS GENERATION

This is used to produce reports from the system. The system is desired to produce four various reports listed in Figure XX. The format of each of the report listed are displayed in Figures XXI - XXV.

RETURN TO DOS

This option is used to move out of the system.

4.7 COST BENEFIT ANALYSIS

This will be discussed under two subheadings namely:

* Cost Implication
* Benefit of the New System

4.7.1 COST IMPLICATION

* Computer Hardware

1 No. Computer with the following configuration:

Pentium 400 Mhz

64MB RAM

6.4GB Hard Disk

	3.5" Disk Drive	
	40X CD-ROM	
	SVGA Monitor	
	Windows 98 Keyboard	
	Mouse + Mouse Pad	
	Software pre-installed.	250,000.00
*	Computer Printer	
	1 No. Printer (LaserJet 1100)	80,000.00
*	Uninterrupted Power Supply	
	1 No. APC Back Up Pro	55,000.00
*	Design and Installation Cost (Software)	220,000.00
*	Procurement & Installation of 2 Nos.	
	Air Conditioners (₦55,000.00 each)	110,000.00
*	Personnel Training	
	2 Operators @ ₦17,500.00 for 2 months	35,000.00
	TOTAL COST	**₦750,000.00**

4.7.2 BENEFITS OF THE NEW SYSTEM

Specifically the General Hospital, Minna would derive the following benefits from this newly designed system:

i. Enhance the efficient operation of the hospital in terms of drugs information handling and management.

ii. Creation of speedy ways and timely response to enquiry on drug information, especially in emergency situations (life saving) thereby enhancing immediate and definite decision making of the recipient.

iii. Avoidance of common problems such as loss of vital information, data mix-up as it is currently being experienced.

iv. Creation of speedy ways of generating reports from the system.

v. Authenticity and reliability of drug information generated is enhanced, since it is never adulterated and above all unbiased.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION & RECOMMENDATION

5.1 SUMMARY

This project work was conceived based on the need to computerise the management of drugs information in General Hospital, Minna. This is expected to aid the hospital in handling and managing information about all the available drugs without problem.

The application of computer for this purpose is to ensure easy storage of data as well as quick retrieval of information stored.

However, a computerised procedure cannot just be put in place without going through some stages of its development. The analysis of this procedures were examined and the result was considered in the design of the proposed system. The considerations of the design is both logical and physical for the necessary requirements. Given the design of the proposed system, the required environment for the system was also considered in terms of the computer configuration. The documentation which serves as the description of the new system was also elaborated for the purpose of reference for users.

5.2 CONCLUSION

The realisation of computer application in all areas has made computers relevant in modern days. This forms the basis of computerization and its introduction in order to replace manual procedures in most organizations.

The computer approach becomes necessary because of its features such as reliability, speed, accuracy, efficiency, data security and host of others.

In this regard , the introduction of computer based system for drug information system would enhance the operation of General Hospital, Minna and also individuals whose primary responsibility is to save lives in terms of drug monograph (detailed information) through speedy retrieval of vital information relating to the utilization, hazard and characteristics of drugs. As a result, rational clinical use of drugs, through the provision of objective, rational, timely, duly processed, pertinent and evaluated scientific and technical information, will be promoted and ensured.

5.3 RECOMMENDATION

In order to achieve the benefit of the application of the proposed system, the following recommendations need to be adopted:

Training Requirement

For a successful implementation and application of a computerised system, the potential users would be required to be trained on various computer application and operation. It is in recognition of this that training is recommended for the potential users of the system. This would expose the potential users to the facilities of the new system. In addition, a general computer training which would expose the users to compute operations for the purpose of other manipulations.

Computer Committee

A committee to monitor the installation and operation of the computer-based system in the hospital needs to be set-up by the Niger State Government. The committee should be given the responsibility of ensuring proper implementation of the system in order to achieve the expected result.

Security of Computer Environment

The expected computer environment should have the necessary cooling facility and security. The security should be designed in such a way that unauthorised users cannot operate the system.

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APPENDIX I: SCREEN DESIGN AND PROGRAM OUTPUT

GENERAL HOSPITAL MINNA

DRUG INFORMATION SYSTEM

M A I N M E N U

A	DRUG INFORMATION MANAGEMENT
B	DRUG ENQUIRY SYSTEM
C	DRUG INFORMATION UPDATE
D	REPORT GENERATION
Q	RETURN TO DOS

MAKE A CHOICE (A, B, C, D or Q):

FIGURE I

GENERAL HOSPITAL MINNA

DRUG INFORMATION SYSTEM

DRUG INFORMATION MANAGEMENT MENU

A	DRUG DATA ENTRY
B	DRUG DATA MODIFICATION
C	DRUG DATA DISPLAY
D	DRUG DATA DELETION
Q	RETURN TO MAIN MENU

MAKE A CHOICE (A, B, C, D or Q):

FIGURE II

DRUG DATA ENTRY FORM

DRUG CODE	DRUG NAME	DRUG CLASS
DAC/0001	PHENOBARBITANE	DRUGS ACTING ON BRAIN

GROUP: ANTICONVULSANT

SIDE EFFECTS: RESPIRATORY DEPRESSION,SEDATION,ALLERGIC REACTION PARTICULARLY AFFECTING THE SKIN

CONTRAINDICATION: SEVERE IMPAIRED RENAL OR HEPATIC FUNCTION

PRECAUTION: ELDERLY PATIENT,RESPIRATORY INSUFFICIENT

KINETICS: READILY ABSORB FROM G.I.T,EXCRETED IN URINE

POISONING: PROLONGED COMA,RESPIRATORY DEPRESSION AND DEATH

Press any key for the Drug Indications Entry

FIGURE III

INDICATIONS ENTRY SCREEN

DRUG CODE: DAC/0001 DRUG NAME: PHENOBARBITANE

S/NO	CODE	DESCRIPTION	DOSE
1	HYP/001	HYPNOTIC	100MG NOCTE
2	SED/001	SEDATIVE	15-30MG TID OR QID
3	EPI/001	EPILEPSY	30-60MG BID OR TID

TO UPDATE FILE (Y/N):

FIGURE IV

DRUG DATA MODIFICATION FORM

DRUG CODE	DRUG NAME	DRUG CLASS
DAC/0001	PHENOBARBITANE	DRUGS ACTING ON BRAIN

GROUP: ANTICONVULSANT

SIDE EFFECTS: RESPIRATORY DEPRESSION,SEDATION,ALLERGIC REACTION PARTICULARLY AFFECTING THE SCREEN

CONTRAINDICATION: SEVERE IMPAIRED RENAL OR HEPATIC FUNCTION

PRECAUTION: ELDERLY PATIENT,RESPIRATORY INSUFFICIENT

KINETICS: READILY ABSORB FROM G.I.T,EXCRETED IN URINE

POISONING: PROLONGED COMA,RESPIRATORY DEPRESSION AND DEATH

Press any key for the Drug Indications Entry

FIGURE V

INDICATIONS MODIFICATION SCREEN

DRUG CODE: DAC/0001 DRUG NAME: PHENOBARBITANE

S/NO	CODE	DESCRIPTION	DOSE
1	HYP/001	HYPNOTIC	100MG NOCTE
2	SED/001	SEDATIVE	15-30MG TID OR QID
3	EPI/001	EPILEPSY	30-60MG BID OR TID

TO UPDATE FILE (Y/N):

FIGURE VI

DRUG DATA DISPLAY FORM

DRUG CODE	DRUG NAME	DRUG CLASS
DAC/0001	PHENOBARBITANE	DRUGS ACTING ON BRAIN

GROUP: ANTICONVULSANT

SIDE EFFECTS: RESPIRATORY DEPRESSION,SEDATION,ALLERGIC REACTION PARTICULARLY AFFECTING THE SCREEN

CONTRAINDICATION: SEVERE IMPAIRED RENAL OR HEPATIC FUNCTION

PRECAUTION: ELDERLY PATIENT,RESPIRATORY INSUFFICIENT

KINETICS: READILY ABSORB FROM G.I.T,EXCRETED IN URINE

POISONING: PROLONGED COMA,RESPIRATORY DEPRESSION AND DEATH

Press any key for the Drug Indications Display

FIGURE VII

INDICATIONS DISPLAY SCREEN

DRUG CODE: DAC/0001 DRUG NAME: PHENOBARBITANE

S/NO	CODE	DESCRIPTION	DOSE
1	HYP/001	HYPNOTIC	100MG NOCTE
2	SED/001	SEDATIVE	15-30MG TID OR QID
3	EPI/001	EPILEPSY	30-60MG BID OR TID

VIEWING DRUG DATA - Press any key to exit

FIGURE VIII

DRUG DATA DELETION FORM

DRUG CODE	DRUG NAME	DRUG CLASS
DAC/0001	PHENOBARBITANE	DRUGS ACTING ON BRAIN

GROUP: ANTICONVULSANT

SIDE EFFECTS: RESPIRATORY DEPRESSION,SEDATION,ALLERGIC REACTION PARTICULARLY AFFECTING THE SCREEN

CONTRAINDICATION: SEVERE IMPAIRED RENAL OR HEPATIC FUNCTION

PRECAUTION: ELDERLY PATIENT,RESPIRATORY INSUFFICIENT

KINETICS: READILY ABSORB FROM G.I.T,EXCRETED IN URINE

POISONING: PROLONGED COMA,RESPIRATORY DEPRESSION AND DEATH

Press any key for the Drug Indications Display

FIGURE IX

INDICATIONS DELETION SCREEN

DRUG CODE: DAC/0001 DRUG NAME: PHENOBARBITANE

S/NO	CODE	DESCRIPTION	DOSE
1	HYP/001	HYPNOTIC	100MG NOCTE
2	SED/001	SEDATIVE	15-30MG TID OR QID
3	EPI/001	EPILEPSY	30-60MG BID OR TID

TO DELETE THIS RECORD (Y/N):

FIGURE X

GENERAL HOSPITAL MINNA

DRUG INFORMATION SYSTEM

DRUG ENQUIRY SYSTEM MENU

A	DRUG USEFULNESS ENQUIRY
B	DRUG-DISEASE ENQUIRY
C	DRUG LINE ENQUIRY
Q	RETURN TO MAIN MENU

MAKE A CHOICE (A, B, C or Q):

FIGURE XI

DRUG USEFULNESS ENQUIRY SCREEN

DRUG CODE: DAC/0001 DRUG NAME: PHENOBARBITANE

S/NO	CODE	DESCRIPTION	DOSE
1	HYP/001	HYPNOTIC	100MG NOCTE
2	SED/001	SEDATIVE	15-30MG TID OR QID
3	EPI/001	EPILEPSY	30-60MG BID OR TID

DISPLAYING DRUG USEFULNESS - Press any key to exit

FIGURE XII

DRUG DISEASES ENQUIRY SCREEN

INDICATION CODE: MAF/001 DESCRIPTION: MALARIA FEVER

S/NO	CODE	DESCRIPTION	DOSE
1	ATM/0001	CHLOROQUINE	600*2DAYS,300MG*1DAY
2	ATM/0002	PRIMAQUINE	300UG/KG BW OD*14DAY

DISPLAYING DRUG & DISEASES - Press any key to exit

FIGURE XIII

DRUGLINE ENQUIRY FORM

DRUG CODE: ATB/0003 DRUG NAME: CHLORAMPHENICOL

QUESTION NUMBER: 000001 QUESTION DATE: 02/02/89

ENQUIRY: HOW SAVE IS CHLORAMPHENICOL IN PREGNANCY?

RESPONSE: CHLORAMPHENICOL IS NOT CONTRA-INDICATED IN PREGNANCY BUT IT IS BEST AVOIDED DURING PREGNANCY.

SOURCE OF RESPONSE: MARTINDALE (The External Pharmacopoeia)

RESEARCHER'S NAME : AFUSA SHITTU (Miss)

DISPLAYING DRUGLINE INFORMATION, Press any key

FIGURE XIV

GENERAL HOSPITAL MINNA

DRUG INFORMATION SYSTEM

DRUG INFORMATION UPDATE MENU

A	DRUG CLASS UPDATE
B	DRUG INDICATION UPDATE
C	DRUGLINE UPDATE
D	FEEDBACK UPDATE
Q	RETURN TO MAIN MENU

MAKE A CHOICE (A, B, C, D or Q):

FIGURE XV

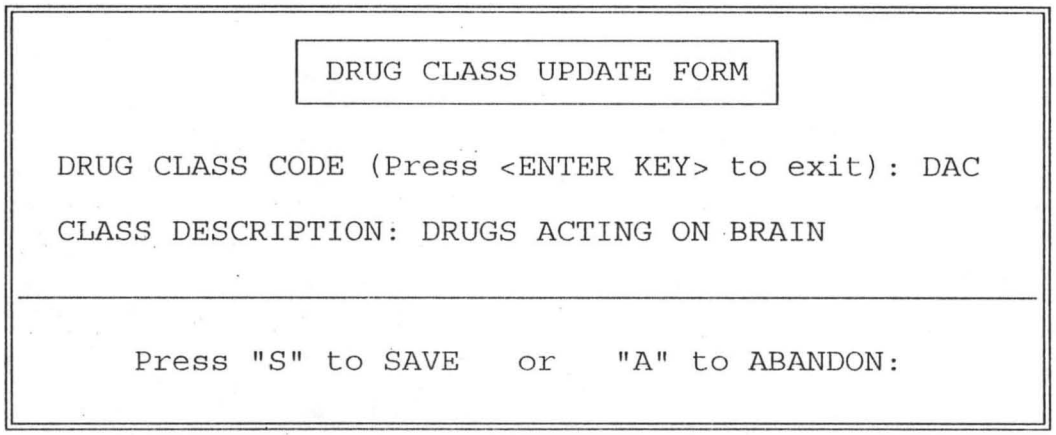
DRUG CLASS UPDATE FORM
DRUG CLASS CODE (Press <ENTER KEY> to exit): DAC
CLASS DESCRIPTION: DRUGS ACTING ON BRAIN
Press "S" to SAVE or "A" to ABANDON:

FIGURE XVI

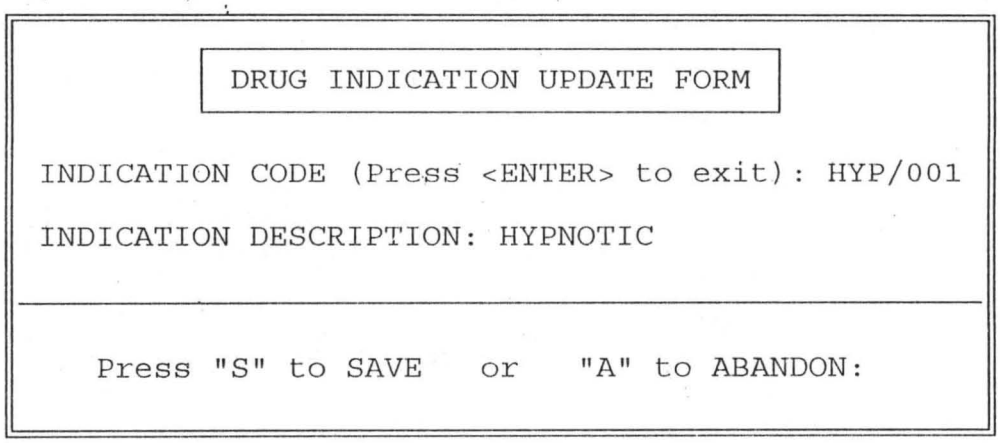
DRUG INDICATION UPDATE FORM
INDICATION CODE (Press <ENTER> to exit): HYP/001
INDICATION DESCRIPTION: HYPNOTIC
Press "S" to SAVE or "A" to ABANDON:

FIGURE XVII

DRUGLINE UPDATE FORM

DRUG CODE: ATB/0003 DRUG NAME: CHLORAMPHENICOL

QUESTION NUMBER: 000001 QUESTION DATE: 02/02/89

ENQUIRY: HOW SAVE IS CHLORAMPHENICOL IN PREGNANCY?

RESPONSE: CHLORAMPHENICOL IS NOT CONTRA-INDICATED IN PREGNANCY BUT IT IS BEST AVOIDED DURING PREGNANCY.

SOURCE OF RESPONSE: MARTINDALE (The External Pharmacopoeia)

PHARMACIST NAME : AFUSA SHITTU (Miss)

Press "S" to SAVE or "A" to ABANDON:

FIGURE XVIII

FEEDBACK UPDATE FORM

HOSPITAL NO (Press <ENTER KEY> to exit): 98/000001 DATE: 05/01/98

NAME OF PATIENT: NWEZE BERNARD

SEX: M AGE: 29 LOCATION (Enter "WARD" or "OPD"): OPD

DIAGNOSIS: INSOMIA

NAME OF DRUG: TRANCOPAL

DATE BEGUN	DAILY DOSE	FREQUENCY	ROUTE OF ADMINISTRATION
05/01/98	1 TABLET	NOCTE	ORAL

USE OF DRUG: SEDATIVE

ADVERSE REACTION: SEVERE DIAPHRAM CONTRACTION

DATE OF REACTION: 06/01/98 PHARMACIST NAME: ALH. AUDI MOHAMMED

Press "S" to SAVE or "A" to ABANDON:

FIGURE XIX

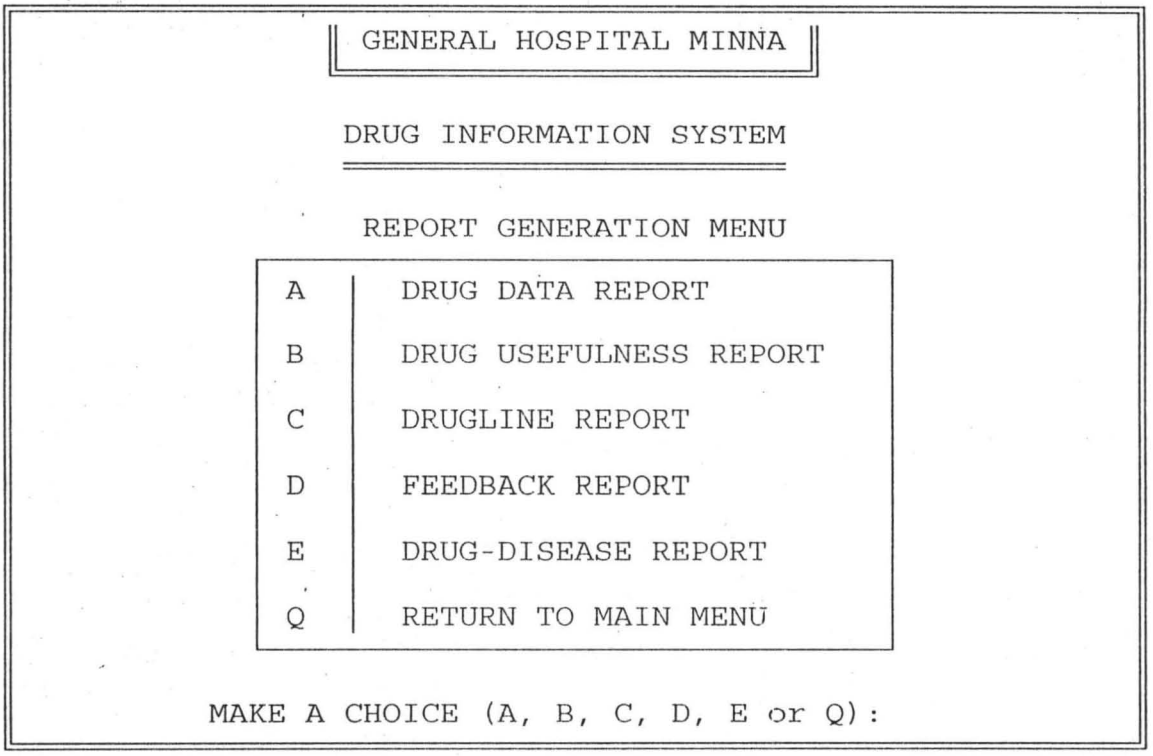
GENERAL HOSPITAL MINNA
DRUG INFORMATION SYSTEM
REPORT GENERATION MENU
A
DRUG DATA REPORT
B
DRUG USEFULNESS REPORT
C
DRUGLINE REPORT
D
FEEDBACK REPORT
E
DRUG-DISEASE REPORT
Q
RETURN TO MAIN MENU
MAKE A CHOICE (A, B, C, D, E or Q):

FIGURE XX

DRUG DATA REPORT
==========

DRUG CODE:	DAC/0001
DRUG NAME:	PHENOBARBITANE
DRUG CLASS:	DRUGS ACTING ON BRAIN
GROUP:	ANTICONVULSANT
SIDE EFFECTS:	RESPIRATORY DEPRESSION,SEDATION,ALLERGIC REACTION PARTICULARLY AFFECTING THE SCREEN
CONTRAINDICATION:	SEVERE IMPAIRED RENAL OR HEPATIC FUNCTION
PRECAUTION:	ELDERLY PATIENT,RESPIRATORY INSUFFICIENT
KINETICS:	READILY ABSORB FROM G.I.T,EXCRETED IN URINE
POISONING:	PROLONGED COMA,RESPIRATORY DEPRESSION AND DEATH

FIGURE XXI

DRUGLINE REPORT
==========

DRUG CODE: ATB/0003 DRUG NAME: CHLORAMPHENICOL

QUESTION NUMBER: 000001 QUESTION DATE: 02/02/89

ENQUIRY: HOW SAVE IS CHLORAMPHENICOL IN PREGNANCY?

RESPONSE:CHLORAMPHENICOL IS NOT CONTRA-INDICATED IN PREGNA-
NCY BUT IT IS BEST AVOIDED DURING PREGNANCY.

SOURCE OF RESPONSE:MARTINDALE (The External Pharmacopoeia)

PHARMACIST NAME :AFUSA SHITTU (Miss)

FIGURE XXIII

FEEDBACK REPORT
==========

HOSPITAL NO: 98/000001 DATE: 05/01/98

NAME OF PATIENT: NWEZE BERNARD

SEX: M AGE: 29 LOCATION: OPD

DIAGNOSIS: INSOMIA

NAME OF DRUG: TRANCOPAL

DATE BEGUN: 05/01/98 DAILY DOSE: 1 TABLET

FREQUENCY: NOCTE ROUTE OF ADMINISTRATION: ORAL

USE OF DRUG: SEDATIVE

ADVERSE REACTION: SEVERE DIAPHRAM CONTRACTION

DATE OF REACTION: 06/01/98 PHARMACIST NAME: ALH. AUDI MOHAMMED

FIGURE XXIV

DRUG DISEASE REPORT

INDICATION CODE:MAF/001 DESCRIPTION:MALARIA FEVER

S/NO	CODE	DESCRIPTION	DOSE
1	ATM/0001	CHLOROQUINE	600*2DAYS,300MG*1DAY
2	ATM/0002	PRIMAQUINE	300UG/KG BW OD*14DAY

FIGURE XXV

APPENDIX II (PROGRAM DOCUMENTATION)

DIS.PRG

```
set talk off
set stat off
set scor off
set safe off
set bell off
set date brit
do whil .t.
 clea
 @ 1,27 to 3,52 doub
 @ 1,10 to 22,69 doub
 @ 2,29 say 'GENERAL HOSPITAL MINNA'
 @ 5,28 say 'DRUG INFORMATION SYSTEM'
 @ 6,28 to 6,50 doub
 @ 8,30 say 'M A I N  M E N U'
 @ 10,22 say 'A     DRUG INFORMATION MANAGEMENT'
 @ 12,22 say 'B     DRUG ENQUIRY SYSTEM'
 @ 14,22 say 'C     DRUG INFORMATION UPDATE'
 @ 16,22 say 'D     REPORT GENERATION'
 @ 18,22 say 'Q     RETURN TO DOS'
 @ 9,25 to 19,59
 @ 9,20 to 19,59
 do whil .t.
  choice = ' '
  @ 21,23 say 'MAKE A CHOICE (A, B, C, D or Q):' get choice pict '!'
  read
  if choice $ 'ABCDQ'
   exit
  endi
 endd
 do case
  case choice = 'A'
   do manage
  case choice = 'B'
```

```
      do manage
    case choice='B'
      do enquiry
    case choice='C'
      do update
    case choice='D'
      do report
    othe
      exit
  endc
endd
clea
retu
```

MANAGE.PRG

```
do whil .t.
  clea
  @ 1,27 to 3,52 doub
  @ 1,10 to 22,69 doub
  @ 2,29 say 'GENERAL HOSPITAL MINNA'
  @ 5,28 say 'DRUG INFORMATION SYSTEM'
  @ 6,28 to 6,50 doub
  @ 8,24 say 'DRUG INFORMATION MANAGEMENT MENU'
  @ 10,25 say 'A     DRUG DATA ENTRY'
  @ 12,25 say 'B     DRUG DATA MODIFICATION'
  @ 14,25 say 'C     DRUG DATA DISPLAY'
  @ 16,25 say 'D     DRUG DATA DELETION'
  @ 18,25 say 'Q     RETURN TO MAIN MENU'
  @ 9,28 to 19,56
  @ 9,23 to 19,56
  do whil .t.
    choice=' '
    @ 21,23 say 'MAKE A CHOICE (A, B, C, D or Q):' get choice pict '!'
```

```
    read
    if choice $ 'ABCDQ'
      exit
    endi
  endd
  do case
    case choice='A'
      do dentry
    case choice='B'
      do dmodify
    case choice='C'
      do dlisting
    case choice='D'
      do derase
    othe
      exit
  endc
endd
retu
```

ENQUIRY.PRG

```
do whil .t.
  clea
  @ 2,27 to 4,52 doub
  @ 2,10 to 21,69 doub
  @ 3,29 say 'GENERAL HOSPITAL MINNA'
  @ 6,28 say 'DRUG INFORMATION SYSTEM'
  @ 7,28 to 7,50 doub
  @ 9,28 say 'DRUG ENQUIRY SYSTEM MENU'
  @ 11,25 say 'A     DRUG USEFULNESS ENQUIRY'
  @ 13,25 say 'B    DRUG-DISEASE ENQUIRY'
  @ 15,25 say 'C     DRUG LINE ENQUIRY'
  @ 17,25 say 'Q     RETURN TO MAIN MENU'
```

```
 @ 10,28 to 18,56
 @ 10,22 to 18,56
 do whil .t.
  choice = ' '
  @ 20,24 say 'MAKE A CHOICE (A, B, C or Q):' get choice pict '!'
  read
  if choice $ 'ABCQ'
   exit
  endi
 endd
 do case
  case choice = 'A'
   do useful
  case choice = 'B'
   do disease
  case choice = 'C'
   do dgline1
  othe
   exit
 endc
endd
retu
```

UPDATE.PRG

```
do whil .t.
 clea
 @ 1,27 to 3,52 doub
 @ 1,10 to 22,69 doub
 @ 2,29 say 'GENERAL HOSPITAL MINNA'
 @ 5,28 say 'DRUG INFORMATION SYSTEM'
 @ 6,28 to 6,50 doub
 @ 8,26 say 'DRUG INFORMATION UPDATE MENU'
 @ 10,25 say 'A     DRUG CLASS UPDATE'
```

```
   @ 12,25 say 'B    DRUG INDICATION UPDATE'
   @ 14,25 say 'C    DRUGLINE UPDATE'
   @ 16,25 say 'D    FEEDBACK UPDATE'
   @ 18,25 say 'Q    RETURN TO MAIN MENU'
   @ 9,28 to 19,56
   @ 9,23 to 19,56
   do whil .t.
    choice = ' '
    @ 21,23 say 'MAKE A CHOICE (A, B, C, D or Q):' get choice pict '!'
    read
    if choice $ 'ABCDQ'
     exit
    endi
   endd
   do case
    case choice = 'A'
     do class
    case choice = 'B'
     do indicate
    case choice = 'C'
     do dgline2
    case choice = 'D'
     do feedback
    othe
     exit
   endc
endd
retu
```

REPORT.PRG

```
do whil .t.
 clea
 @ 1,27 to 3,52 doub
```

```
@ 1,10 to 24,69 doub
@ 2,29 say 'GENERAL HOSPITAL MINNA'
@ 5,28 say 'DRUG INFORMATION SYSTEM'
@ 6,28 to 6,50 doub
@ 8,29 say 'REPORT GENERATION MENU'
@ 10,25 say 'A     DRUG DATA REPORT'
@ 12,25 say 'B     DRUG USEFULNESS REPORT'
@ 14,25 say 'C     DRUGLINE REPORT'
@ 16,25 say 'D     FEEDBACK REPORT'
@ 18,25 say 'E     DRUG-DISEASE REPORT'
@ 20,25 say 'Q     RETURN TO MAIN MENU'
@ 9,28 to 21,56
@ 9,23 to 21,56
do whil .t.
  choice = ' '
  @ 23,21 say 'MAKE A CHOICE (A, B, C, D, E or Q):' get choice pict '!'
  read
  if choice $ 'ABCDEQ'
    exit
  endi
endd
do case
  case choice = 'A'
    do report1
  case choice = 'B'
    do report2
  case choice = 'C'
    do report3
  case choice = 'D'
    do report4
  case choice = 'E'
    do report5
  othe
    exit
endc
```

```
endd
retu
```

DENTRY.PRG

```
use indicate
copy stru to temp1.dbf
sele a
 use drug
sele b
 use class
sele c
 use use
sele d
 use temp1
do whil .t.
 clea
 @ 2,30 say 'DRUG DATA ENTRY FORM'
 @ 1,28 to 3,51 doub
 @ 1,3 to 23,76 doub
 @ 21,4 to 21,75
 mdcode = spac(8)
 @ 5,5 say 'DRUG CODE (Press <ENTER KEY> to exit):' get mdcode pict
'!!!/9999'
 read
 if mdcode = spac(8)
  exit
 endi
 subcode = substr(mdcode,1,3)
 sele b
 go top
 loca for subcode = class
 if .not. foun()
  @ 22,15 say 'CLASS CODE NOT APPLICABLE - Press any key to exit'
```

```
 set cons off
 wait
 set cons on
 loop
endi
mdescr=descr
sele a
go top
loca for mdcode=dcode
if foun()
 @ 22,17 say 'DRUG CODE ALREADY EXIST - Press any key to exit'
 set cons off
 wait
 set cons on
 loop
endi
muses=0
stor spac(20) to mdname,mdose
stor spac(50) to mdgrp,mside1,mside2
stor spac(50) to mcontra,mcaution,mkinet,mpoison
@ 5,5 clea to 5,52
@ 5,5 say 'DRUG CODE'
@ 5,21 say 'DRUG NAME'
@ 5,46 say 'DRUG CLASS'
@ 6,5 get mdcode
@ 6,43 get mdescr
clea gets
@ 6,18 get mdname pict '@!'
@ 8,5 say 'GROUP:          ' get mdgrp pict '@!'
@ 10,5 say 'SIDE EFFECTS:    ' get mside1 pict '@!'
@ 12,5 say '                 ' get mside2 pict '@!'
@ 14,5 say 'CONTRAINDICATION:' get mcontra pict '@!'
@ 16,5 say 'PRECAUTION:      ' get mcaution pict '@!'
@ 18,5 say 'KINETICS:        ' get mkinet pict '@!'
@ 20,5 say 'POISONING:       ' get mpoison pict '@!'
```

```
  go top
  loca for ucode = mucode
  if .not. foun()
    @ 23,20 say 'ILLEGAL INDICATION CODE - Press any key'
    set cons off
    wait
    set cons on
    @ 23,20 clea to 23,59
    loop
  endi
  mudescr = udescr
  sele d
  if .not. eof()
    go top
    loca for ucode = mucode
    if foun()
      @ 23,19 say 'DUPLICATE INDICATION CODE - Press any key'
      set cons off
      wait
      set cons on
      @ 23,19 clea to 23,60
      loop
    endi
  endi
  exit
endd
@ r,28 get mudescr
clea gets
mdose = spac(20)
@ r,50 get mdose pict '@!'
read
appe blan
repl dcode with mdcode,dname with mdname
repl ucode with mucode,udescr with mudescr
repl dose with mdose
```

```
  @ 23,23 say 'TO ENTER MORE INDICATIONS (Y/N):'
  do whil .t.
    choice = ' '
    @ 23,56 get choice pict '!'
    read
    if choice $ 'YN'
      exit
    endi
  endd
  @ 23,22 clea to 23,57
  if choice = 'N'
    exit
  endi
  r = r + 2
  if r > 21
    @ 7,2 clea to 21,7
    @ 7,9 clea to 21,19
    @ 7,21 clea to 21,52
    @ 7,54 clea to 21,63
    @ 7,65 clea to 21,77
    r = 7
  endi
endd
clos all
@ 23,28 say 'TO UPDATE FILE (Y/N):'
do whil .t.
  choice = ' '
  @ 23,50 get choice pict '!'
  read
  if choice $ 'YN'
    exit
  endi
endd
if choice = 'Y'
  use drug
```

```
    appe blan
    repl dcode with mdcode,dname with mdname
    repl dclass with mdescr,dgrp with mdgrp
    repl side1 with mside1,side2 with mside2
    repl contra with mcontra,caution with mcaution
    repl kinet with mkinet,poison with mpoison
    use indicate
    appe from temp1
  endi
  use temp1
  zap
  use
  sele a
    use drug
  sele b
    use class
  sele c
    use use
  sele d
    use temp1
endd
clos all
retu
```

DMODIFY.PRG

```
use indicate
copy stru to temp1
copy stru to temp2
do whil .t.
  clea
  @ 2,26 say 'DRUG DATA MODIFICATION FORM'
  @ 1,24 to 3,54 doub
  @ 1,3 to 23,76 doub
```

```
 @ 21,4 to 21,75
 mdcode = spac(8)
 @ 5,5 say 'DRUG CODE (Press <ENTER KEY> to exit):' get mdcode pict
'!!!/9999'
 read
 if mdcode = spac(8)
   exit
 endi
 subcode = substr(mdcode,1,3)
 use class
 loca for subcode = class
 if .not. foun()
   @ 22,15 say 'CLASS CODE NOT APPLICABLE - Press any key to exit'
   set cons off
   wait
   set cons on
   loop
 endi
 mdescr = descr
 use drug
 loca for mdcode = dcode
 if .not. foun()
   @ 22,16 say 'DRUG CODE DOES NOT EXIST - Press any key to exit'
   set cons off
   wait
   set cons on
   loop
 endi
 muses = 0
 mdname = dname
 mdose = dose
 mdgrp = dgrp
 mside1 = side1
 mside2 = side2
 mcontra = contra
```

```
mcaution = caution
mkinet = kinet
mpoison = poison
@ 5,5 clea to 5,52
@ 5,5 say 'DRUG CODE'
@ 5,21 say 'DRUG NAME'
@ 5,46 say 'DRUG CLASS'
@ 6,5 get mdcode
@ 6,43 get mdescr
@ 6,18 get mdname pict '@!'
@ 8,5 say 'GROUP:            ' get mdgrp pict '@!'
@ 10,5 say 'SIDE EFFECTS:    ' get mside1 pict '@!'
@ 12,5 say '                 ' get mside2 pict '@!'
@ 14,5 say 'CONTRAINDICATION:' get mcontra pict '@!'
@ 16,5 say 'PRECAUTION:      ' get mcaution pict '@!'
@ 18,5 say 'KINETICS:        ' get mkinet pict '@!'
@ 20,5 say 'POISONING:       ' get mpoison pict '@!'
clea gets
@ 6,18 get mdname pict '@!'
@ 8,23 get mdgrp pict '@!'
@ 10,23 get mside1 pict '@!'
@ 12,23 get mside2 pict '@!'
@ 14,23 get mcontra pict '@!'
@ 16,23 get mcaution pict '@!'
@ 18,23 get mkinet pict '@!'
@ 20,23 get mpoison pict '@!'
read
@ 22,18 say 'Press any key for the Drug Indications Entry'
set cons off
wait
set cons on
clea
use temp2
appe from indicate.dbf for dcode = mdcode
use
```

```
sele a
 use temp1
sele b
 use temp2
sele c
 use use
@ 0,24 say 'INDICATIONS MODIFICATION SCREEN'
@ 1,24 to 1,54
@ 3,8 say 'DRUG CODE:' get mdcode
@ 3,30 say 'DRUG NAME:' get mdname
clea gets
@ 4,8 to 24,71
@ 5,10 say 'S/NO'
@ 5,18 say 'CODE'
@ 5,30 say 'DESCRIPTION'
@ 5,52 say 'DOSE'
@ 5,15 to 21,15
@ 5,25 to 21,25
@ 5,48 to 21,48
@ 6,9 to 6,14
@ 6,16 to 6,24
@ 6,26 to 6,47
@ 6,49 to 6,70
@ 22,9 to 22,70
sno = 0
r = 5
n1 = 0
sele b
do whil .not. eof()
 r = r + 2
 sno = sno + 1
 n1 = n1 + 1
 mucode = ucode
 mudescr = udescr
 mdose = dose
```

```
   @ r,11 say sno pict '99'
   @ r,17 get mucode pict '!!!/999'
   @ r,28 get mudescr
   @ r,50 get mdose pict '@!'
   clea gets
   skip
  endd
  go top
  sno = 0
  r = 7
  n2 = 0
  do whil .t.
   sno = sno + 1
   n2 = n2 + 1
   @ r,11 say sno pict '99'
   sele b
   if .not. eof()
    mucode = ucode
    mudescr = udescr
    mdose = dose
    skip
   else
    mucode = spac(7)
    mudescr = spac(30)
    mdose = spac(20)
   endi
   do whil .t.
*    mucode = spac(7)
    @ r,17 get mucode pict '!!!/999'
    read
    sele c
    go top
    loca for ucode = mucode
    if .not. foun()
     @ 23,20 say 'ILLEGAL INDICATION CODE - Press any key'
```

```
      set cons off
      wait
      set cons on
      @ 23,20 clea to 23,59
      loop
    endi
    mudescr=udescr
    sele a
    if .not. eof()
      go top
      loca for ucode=mucode
      if foun()
        @ 23,19 say 'DUPLICATE INDICATION CODE - Press any key'
        set cons off
        wait
        set cons on
        @ 23,19 clea to 23,60
        loop
      endi
    endi
    exit
  endd
  @ r,28 get mudescr
  clea gets
*   mdose=spac(20)
  @ r,50 get mdose pict '@!'
  read
  appe blan
  repl dcode with mdcode,dname with mdname
  repl ucode with mucode,udescr with mudescr
  repl dose with mdose
  if n2<n1
    @ 23,22 say 'TO MODIFY MORE INDICATIONS (Y/N):'
  else
    @ 23,23 say 'TO ENTER MORE INDICATIONS (Y/N):'
```

```
    loca for dcode=mdcode
    repl dcode with mdcode,dname with mdname
    repl dclass with mdescr,dgrp with mdgrp
    repl side1 with mside1,side2 with mside2
    repl contra with mcontra,caution with mcaution
    repl kinet with mkinet,poison with mpoison
    use indicate
    dele all for dcode=mdcode
    pack
    appe from temp1
  endi
  use temp1
  zap
  use temp2
  zap
endd
clos all
eras temp1.dbf
eras temp2.dbf
retu
```

DLISTING.PRG

```
use indicate
copy stru to temp1
do whil .t.
  clea
  @ 2,29 say 'DRUG DATA DISPLAY FORM'
  @ 1,27 to 3,52 doub
  @ 1,3 to 23,76 doub
  @ 21,4 to 21,75
  mdcode=spac(8)
  @ 5,5 say 'DRUG CODE (Press <ENTER KEY> to exit):' get mdcode pict
'!!!/9999'
```

```
read
if mdcode = spac(8)
  exit
endi
subcode = substr(mdcode,1,3)
use class
loca for subcode = class
if .not. foun()
  @ 22,15 say 'CLASS CODE NOT APPLICABLE - Press any key to exit'
  set cons off
  wait
  set cons on
  loop
endi
mdescr = descr
use drug
loca for mdcode = dcode
if .not. foun()
  @ 22,16 say 'DRUG CODE DOES NOT EXIST - Press any key to exit'
  set cons off
  wait
  set cons on
  loop
endi
muses = 0
mdname = dname
mdose = dose
mdgrp = dgrp
mside1 = side1
mside2 = side2
mcontra = contra
mcaution = caution
mkinet = kinet
mpoison = poison
@ 5,5 clea to 5,52
```

```
@ 5,5 say 'DRUG CODE'
@ 5,21 say 'DRUG NAME'
@ 5,46 say 'DRUG CLASS'
@ 6,5 get mdcode
@ 6,43 get mdescr
@ 6,18 get mdname pict '@!'
@ 8,5 say 'GROUP:          ' get mdgrp pict '@!'
@ 10,5 say 'SIDE EFFECTS:   ' get mside1 pict '@!'
@ 12,5 say '                ' get mside2 pict '@!'
@ 14,5 say 'CONTRAINDICATION:' get mcontra pict '@!'
@ 16,5 say 'PRECAUTION:     ' get mcaution pict '@!'
@ 18,5 say 'KINETICS:       ' get mkinet pict '@!'
@ 20,5 say 'POISONING:      ' get mpoison pict '@!'
clea gets
@ 22,17 say 'Press any key for the Drug Indications Display'
set cons off
wait
set cons on
clea
use temp1
appe from indicate.dbf for dcode = mdcode
go top
@ 0,27 say 'INDICATIONS DISPLAY SCREEN'
@ 1,27 to 1,52
@ 3,8 say 'DRUG CODE:' get mdcode
@ 3,30 say 'DRUG NAME:' get mdname
clea gets
@ 4,8 to 24,71
@ 5,10 say 'S/NO'
@ 5,18 say 'CODE'
@ 5,30 say 'DESCRIPTION'
@ 5,52 say 'DOSE'
@ 5,15 to 21,15
@ 5,25 to 21,25
@ 5,48 to 21,48
```

```
@ 6,9 to 6,14
@ 6,16 to 6,24
@ 6,26 to 6,47
@ 6,49 to 6,70
@ 22,9 to 22,70
sno = 0
r = 5
n1 = 0
do whil .not. eof()
  r = r + 2
  sno = sno + 1
  n1 = n1 + 1
  mucode = ucode
  mudescr = udescr
  mdose = dose
  @ r,11 say sno pict '99'
  @ r,17 get mucode pict '!!!/999'
  @ r,28 get mudescr
  @ r,50 get mdose pict '@!'
  clea gets
  skip
 endd
 @ 23,19 say 'VIEWING DRUG DATA - Press any key to exit'
 set cons off
 wait
 set cons on
 zap
endd
clos all
eras temp1.dbf
retu
```

DERASE.PRG

```
use indicate
copy stru to temp1
do whil .t.
  clea
  @ 2,28 say 'DRUG DATA DELETION FORM'
  @ 1,26 to 3,52 doub
  @ 1,3 to 23,76 doub
  @ 21,4 to 21,75
  mdcode = spac(8)
  @ 5,5 say 'DRUG CODE (Press <ENTER KEY> to exit):' get mdcode pict
'!!!/9999'
  read
  if mdcode = spac(8)
    exit
  endi
  subcode = substr(mdcode,1,3)
  use class
  loca for subcode = class
  if .not. foun()
    @ 22,15 say 'CLASS CODE NOT APPLICABLE - Press any key to exit'
    set cons off
    wait
    set cons on
    loop
  endi
  mdescr = descr
  use drug
  loca for mdcode = dcode
  if .not. foun()
    @ 22,16 say 'DRUG CODE DOES NOT EXIST - Press any key to exit'
    set cons off
    wait
    set cons on
```

```
  loop
endi
muses = 0
mdname = dname
mdose = dose
mdgrp = dgrp
mside1 = side1
mside2 = side2
mcontra = contra
mcaution = caution
mkinet = kinet
mpoison = poison
@ 5,5 clea to 5,52
@ 5,5 say 'DRUG CODE'
@ 5,21 say 'DRUG NAME'
@ 5,46 say 'DRUG CLASS'
@ 6,5 get mdcode
@ 6,43 get mdescr
@ 6,18 get mdname pict '@!'
@ 8,5 say 'GROUP:          ' get mdgrp pict '@!'
@ 10,5 say 'SIDE EFFECTS:    ' get mside1 pict '@!'
@ 12,5 say '                 ' get mside2 pict '@!'
@ 14,5 say 'CONTRAINDICATION:' get mcontra pict '@!'
@ 16,5 say 'PRECAUTION:      ' get mcaution pict '@!'
@ 18,5 say 'KINETICS:        ' get mkinet pict '@!'
@ 20,5 say 'POISONING:       ' get mpoison pict '@!'
clea gets
@ 22,17 say 'Press any key for the Drug Indications Display'
set cons off
wait
set cons on
clea
use temp1
appe from indicate.dbf for dcode = mdcode
go top
```

```
@ 0,26 say 'INDICATIONS DELETION SCREEN'
@ 1,26 to 1,52
@ 3,8 say 'DRUG CODE:' get mdcode
@ 3,30 say 'DRUG NAME:' get mdname
clea gets
@ 4,8 to 24,71
@ 5,10 say 'S/NO'
@ 5,18 say 'CODE'
@ 5,30 say 'DESCRIPTION'
@ 5,52 say 'DOSE'
@ 5,15 to 21,15
@ 5,25 to 21,25
@ 5,48 to 21,48
@ 6,9 to 6,14
@ 6,16 to 6,24
@ 6,26 to 6,47
@ 6,49 to 6,70
@ 22,9 to 22,70
sno = 0
r = 5
n1 = 0
use temp1
do whil .not. eof()
  r = r + 2
  sno = sno + 1
  n1 = n1 + 1
  mucode = ucode
  mudescr = udescr
  mdose = dose
  @ r,11 say sno pict '99'
  @ r,17 get mucode pict '!!!/999'
  @ r,28 get mudescr
  @ r,50 get mdose pict '@!'
  clea gets
  skip
```

```
 endd
 @ 23,25 say 'TO DELETE THIS RECORD (Y/N):'
 do whil .t.
  choice = ' '
  @ 23,54 get choice pict '!'
  read
  if choice $ 'YN'
   exit
  endi
 endd
 if choice = 'Y'
  use drug
  loca for dcode = mdcode
  dele
  pack
  use indicate
  dele all for dcode = mdcode
  pack
  @ 23,19 say 'RECORD IS DELETED - Press any key to exit'
 else
  @ 23,17 say 'RECORD IS NOT DELETED - Press any key to exit'
 endi
 set cons off
 wait
 set cons on
 use temp1
 zap
endd
clos all
eras temp1.dbf
retu
```

USEFUL.PRG

```
use indicate
sort on dcode to temp2
sele a
 use drug
sele b
 use temp2
do whil .t.
 clea
 @ 1,25 say 'DRUG USEFULNESS ENQUIRY SCREEN'
 @ 0,23 to 2,56 doub
 @ 0,8 to 24,71 doub
 @ 22,9 to 22,70 doub
 mdcode = spac(8)
 @ 4,10 say 'DRUG CODE (Press <ENTER KEY> to exit):' get mdcode pict
'!!!/9999'
 read
 if mdcode = spac(8)
  exit
 endi
 sele a
 go top
 loca for dcode = mdcode
 if .not. foun()
  @ 23,23 say 'ILLEGAL DRUG CODE - Press any key'
  set cons off
  wait
  set cons on
  loop
 endi
 @ 4,10 clea to 4,50
 mdname = dname
 @ 3,10 say 'DRUG CODE:' get mdcode
 @ 3,36 say 'DRUG NAME:' get mdname
```

```
go top
loca for ucode = mucode
if .not. foun()
  @ 23,20 say 'ILLEGAL INDICATION CODE - Press any key'
  set cons off
  wait
  set cons on
  loop
endi
mudescr = udescr
@ 4,10 clea to 4,50
@ 3,10 say 'INDICATION CODE:' get mucode
@ 3,38 say 'DESCRIPTION:' get mudescr
clea gets
@ 4,8 to 4,70
@ 5,9 say 'S/NO'
@ 5,17 say 'CODE'
@ 5,30 say 'DESCRIPTION'
@ 5,52 say 'DOSE'
@ 5,14 to 21,14
@ 5,25 to 21,25
@ 5,48 to 21,48
@ 6,8 to 6,13
@ 6,15 to 6,24
@ 6,26 to 6,47
@ 6,49 to 6,70
sno = 0
r = 5
do whil .not. eof()
  sno = sno + 1
  r = r + 2
  @ r,11 say sno pict '99'
  mdcode = dcode
  mdname = dname
  mdose = dose
```

```
read
if mdcode = spac(8)
  exit
endi
sele a
go top
loca for dcode = mdcode
if .not. foun()
  @ 23,23 say 'ILLEGAL DRUG CODE - Press any key'
  set cons off
  wait
  set cons on
  loop
endi
mdname = dname
@ 4,10 clea to 4,50
@ 4,10 say 'DRUG CODE:' get mdcode
@ 4,33 say 'DRUG NAME:' get mdname
clea gets
sele b
go top
loca for dcode = mdcode
if .not. foun()
  @ 23,20 say 'NO ENTRIES ON THIS DRUG - Press any key'
  set cons off
  wait
  set cons on
  loop
endi
@ 7,8 to 7,71
do whil .not. eof()
  mqsn = qsn
  mqdate = qdate
  menq1 = enq1
  menq2 = enq2
```

```
    mresp1 = resp1
    mresp2 = resp2
    mresp3 = resp3
    msource = source
    mresearch = research
    @ 6,10 say 'QUESTION NUMBER:' get mqsn
    @ 6,36 say 'QUESTION DATE:' get mqdate
    @ 8,10 say 'ENQUIRY: ' get menq1 pict '@!'
    @ 10,20 get menq2 pict '@!'
    @ 11,8 to 11,71
    @ 12,10 say 'RESPONSE:' get mresp1 pict '@!'
    @ 14,20 get mresp2 pict '@!'
    @ 16,20 get mresp3 pict '@!'
    @ 17,8 to 17,71
    @ 18,10 say 'SOURCE OF RESPONSE:' get msource
    @ 20,10 say "RESEARCHER'S NAME :" get mresearch
    clea gets
    @ 23,17 say 'DISPLAYING DRUGLINE INFORMATION, Press any key'
    set cons off
    wait
    set cons on
    skip
    if dcode < > mdcode
      @ 23,17 clea to 23,62
      @ 23,13 say 'DRUGLINE INFORMATION COMPLETED, Press any key to
exit'
      set cons off
      wait
      set cons on
      exit
    endi
  endd
endd
clos all
```

```
clea
retu
```

CLASS.PRG

```
use class
do whil .t.
 clea
 @ 5,12 to 18,66 doub
 @ 14,13 to 14,65
 @ 7,29 say 'DRUG CLASS UPDATE FORM'
 @ 6,27 to 8,52
 mclass = spac(3)
 @ 10,15 say 'DRUG CLASS CODE (Press <ENTER KEY> to exit):' get
mclass pict '@!'
 read
 if mclass = spac(3)
  exit
 endi
 go top
 loca for class = mclass
 if foun()
  @ 16,22 say 'DUPLICATE CLASS CODE - Press any key'
  set cons off
  wait
  set cons on
  loop
 endi
 mdescr = spac(30)
 @ 12,15 say 'CLASS DESCRIPTION:' get mdescr pict '@!'
 read
 do whil .t.
  choice = ' '
```

```
   @ 16,19 say 'Press "S" to SAVE   or   "A" to ABANDON:' get choice pict
'!'
   read
   if choice $ 'SA'
     exit
   endi
  endd
  if choice = 'S'
   appe blan
   repl class with mclass,descr with mdescr
  endi
endd
clos all
clea
retu
```

INDICATE.PRG

```
use use
do whil .t.
  clea
  @ 5,14 to 18,65 doub
  @ 14,15 to 14,64
  @ 7,26 say 'DRUG INDICATION UPDATE FORM'
  @ 6,24 to 8,54
  mucode = spac(7)
  @ 10,16 say 'INDICATION CODE (Press <ENTER> to exit):' get mucode
pict '!!!/999'
  read
  if mucode = spac(7)
    exit
  endi
  go top
  loca for ucode = mucode
```

```
 if foun()
   @ 16,19 say 'DUPLICATE INDICATION CODE - Press any key'
   set cons off
   wait
   set cons on
   loop
 endi
 mudescr=spac(20)
 @ 12,16 say 'INDICATION DESCRIPTION:' get mudescr pict '@!'
 read
 do whil .t.
   choice=' '
   @ 16,19 say 'Press "S" to SAVE   or   "A" to ABANDON:' get choice pict
'!'
   read
   if choice $ 'SA'
     exit
   endi
 endd
 if choice='S'
   appe blan
   repl ucode with mucode,udescr with mudescr
 endi
endd
clos all
clea
retu
```

DGLINE2.PRG

```
sele a
 use drug
sele b
 use drugline
```

```
sele a
do whil .t.
 clea
 @ 0,7 to 24,72 doub
 @ 21,8 to 21,71 doub
 @ 1,30 say 'DRUGLINE UPDATE FORM'
 @ 2,30 to 2,49 doub
 mdcode = spac(8)
 @ 4,10 say 'DRUG CODE (Press <ENTER KEY> to exit):' get mdcode pict
'!!!/9999'
 read
 if mdcode = spac(8)
  exit
 endi
 go top
 loca for dcode = mdcode
 if .not. foun()
  @ 23,23 say 'ILLEGAL DRUG CODE - Press any key'
  set cons off
  wait
  set cons on
  loop
 endi
 mdname = dname
 @ 4,10 clea to 4,50
 @ 4,10 say 'DRUG CODE:' get mdcode
 @ 4,33 say 'DRUG NAME:' get mdname
 clea gets
 mqsn = spac(6)
 mqdate = ctod('  /  /  ')
 stor spac(50) to menq1,menq2
 stor spac(50) to mresp1,mresp2,mresp3
 stor spac(40) to msource,mresearch
 @ 7,8 to 7,71
 @ 6,10 say 'QUESTION NUMBER:' get mqsn
```

```
 @ 6,36 say 'QUESTION DATE:' get mqdate
 @ 8,10 say 'ENQUIRY: ' get menq1 pict '@!'
 @ 10,20 get menq2 pict '@!'
 @ 11,8 to 11,71
 @ 12,10 say 'RESPONSE:' get mresp1 pict '@!'
 @ 14,20 get mresp2 pict '@!'
 @ 16,20 get mresp3 pict '@!'
 @ 17,8 to 17,71
 @ 18,10 say 'SOURCE OF RESPONSE:' get msource
 @ 20,10 say "PHARMACIST NAME :" get mresearch
 read
 do whil .t.
  choice = ' '
  @ 23,19 say 'Press "S" to SAVE   or   "A" to ABANDON:' get choice pict
'!'
  read
  if choice $ 'SA'
   exit
  endi
 endd
 if choice = 'S'
  sele b
  appe blan
  repl qsn with mqsn,qdate with mqdate
  repl dcode with mdcode,dname with mdname
  repl enq1 with menq1,enq2 with menq2
  repl resp1 with mresp1,resp2 with mresp2
  repl resp3 with mresp3,research with mresearch
  repl source with msource
  sele a
 endi
endd
clos all
clea
retu
```

FEEDBACK.PRG

```
use feedback
do whil .t.
 clea
 @ 0,4 to 24,75 doub
 @ 1,30 say 'FEEDBACK UPDATE FORM'
 @ 2,30 to 2,49 doub
 @ 22,5 to 22,74
 mhpno = spac(9)
 @ 4,6 say 'HOSPITAL NO (Press <ENTER KEY> to exit):' get mhpno pict
'99/999999'
 read
 if mhpno = spac(9)
  exit
 endi
 stor ctod('  /  /  ') to mdate,mdateb,mdater
 stor spac(40) to mname
 stor spac(10) to mfreq,mroute
 msex = ' '
 mage = '  '
 mdname = spac(45)
 muse = spac(45)
 mdiag = spac(50)
 mlocate = spac(4)
 mdosage = spac(15)
 madverse = spac(50)
 mresp = spac(20)
 @ 4,60 say 'DATE:' get mdate
 @ 6,6 say 'NAME OF PATIENT:' get mname pict '@!'
 @ 8,6 say 'SEX:' get msex pict '!'
 @ 8,17 say 'AGE:' get mage pict '99'
 @ 8,29 say 'LOCATION (Enter "WARD" or "OPD"):' get mlocate
 @ 10,6 say 'DIAGNOSIS:' get mdiag pict '@!'
 @ 12,6 say 'NAME OF DRUG:' get mdname pict '@!'
```

```
 @ 14,6 say 'DATE BEGUN'
 @ 14,21 say 'DAILY DOSE'
 @ 14,38 say 'FREQUENCY'
 @ 14,51 say 'ROUTE OF ADMINISTRATION'
 @ 15,7 get mdateb
 @ 15,19 get mdosage pict '@!'
 @ 15,38 get mfreq pict '@!'
 @ 15,55 get mroute pict '@!'
 @ 17,6 say 'USE OF DRUG:' get muse pict '@!'
 @ 19,6 say 'ADVERSE REACTION:' get madverse pict '@!'
 @ 21,6 say 'DATE OF REACTION:' get mdater
 @ 21,37 say 'PHARMACIST NAME:' get mresp pict '@!'
 read
 do whil .t.
  choice = ' '
  @ 23,19 say 'Press "S" to SAVE   or   "A" to ABANDON:' get choice pict
'!'
  read
  if choice $ 'SA'
   exit
  endi
 endd
 if choice = 'S'
  appe blan
  repl date with mdate,dateb with mdateb
  repl dater with mdater,diag with mdiag
  repl name with mname,dname with mdname
  repl use with muse,freq with mfreq
  repl sex with msex,route with mroute
  repl age with mage,locate with mlocate
  repl dosage with mdosage,resp with mresp
  repl adverse with madverse,hpno with mhpno
 endi
endd
clos all
```

```
clea
retu
```

REPORT1.PRG

```
use indicate
do whil .t.
  clea
  @ 2,27 say 'DRUG DATA PRINTING SCREEN'
  @ 1,25 to 3,53 doub
  @ 1,3 to 24,76 doub
  @ 21,4 to 21,75
  mdcode = spac(8)
  @ 5,5 say 'DRUG CODE (Press <ENTER KEY> to exit):' get mdcode pict
'!!!/9999'
  read
  if mdcode = spac(8)
    exit
  endi
  subcode = substr(mdcode,1,3)
  use class
  loca for subcode = class
  if .not. foun()
    @ 23,15 say 'CLASS CODE NOT APPLICABLE - Press any key to exit'
    set cons off
    wait
    set cons on
    loop
  endi
  mdescr = descr
  use drug
  loca for mdcode = dcode
  if .not. foun()
    @ 23,16 say 'DRUG CODE DOES NOT EXIST - Press any key to exit'
```

```
  set cons off
  wait
  set cons on
  loop
endi
muses = 0
mdname = dname
mdose = dose
mdgrp = dgrp
mside1 = side1
mside2 = side2
mcontra = contra
mcaution = caution
mkinet = kinet
mpoison = poison
@ 5,5 clea to 5,52
@ 5,5 say 'DRUG CODE'
@ 5,21 say 'DRUG NAME'
@ 5,46 say 'DRUG CLASS'
@ 6,5 get mdcode
@ 6,43 get mdescr
@ 6,18 get mdname pict '@!'
@ 8,5 say 'GROUP:          ' get mdgrp pict '@!'
@ 10,5 say 'SIDE EFFECTS:    ' get mside1 pict '@!'
@ 12,5 say '                 ' get mside2 pict '@!'
@ 14,5 say 'CONTRAINDICATION:' get mcontra pict '@!'
@ 16,5 say 'PRECAUTION:      ' get mcaution pict '@!'
@ 18,5 say 'KINETICS:        ' get mkinet pict '@!'
@ 20,5 say 'POISONING:       ' get mpoison pict '@!'
clea gets
@ 23,19 say 'TO SEND THIS DATA TO THE PRINTER (Y/N):'
do whil .t.
  resp = ' '
  @ 23,59 get resp pict '!'
  read
```

```
    if resp $ 'YN'
      exit
    endi
  endd
  if resp='Y'
    set devi to prin
    @ 1,32 say 'DRUG DATA REPORT'
    @ 2,32 say repl('=',16)
    @ 4,5 say 'DRUG CODE:        '+mdcode
    @ 6,5 say 'DRUG NAME:        '+mdname
    @ 8,5 say 'DRUG CLASS:       '+mdescr
    @ 10,5 say 'GROUP:           '+mdgrp
    @ 12,5 say 'SIDE EFFECTS:    '+mside1
    @ 14,5 say '                 '+mside2
    @ 16,5 say 'CONTRAINDICATION: '+mcontra
    @ 18,5 say 'PRECAUTION:      '+mcaution
    @ 20,5 say 'KINETICS:        '+mkinet
    @ 22,5 say 'POISONING:       '+mpoison
    ejec
    set devi to scre
  endi
endd
clos all
retu
```

REPORT2.PRG

```
use indicate
sort on dcode to temp2
sele a
  use drug
sele b
  use temp2
do whil .t.
```

```
clea
@ 1,29 say 'REPORT PRINTING SCREEN'
@ 0,27 to 2,52 doub
@ 0,8 to 24,71 doub
@ 22,9 to 22,70 doub
mdcode = spac(8)
@ 4,10 say 'DRUG CODE (Press <ENTER KEY> to exit):' get mdcode pict
'!!!/9999'
read
if mdcode = spac(8)
  exit
endi
sele a
go top
loca for dcode = mdcode
if .not. foun()
  @ 23,23 say 'ILLEGAL DRUG CODE - Press any key'
  set cons off
  wait
  set cons on
  loop
endi
mdname = dname
@ 6,10 say 'DRUG NAME:' get mdname
clea gets
sele b
go top
loca for dcode = mdcode
if .not. foun()
  @ 23,20 say 'NO ENTRIES ON THIS DRUG - Press any key'
  set cons off
  wait
  set cons on
  loop
endi
```

```
@ 10,22 to 14,56
@ 11,24 say 'Printing DRUG USEFULNESS REPORT'
@ 13,27 say 'TO START PRINTING (Y/N):'
do whil .t.
 resp = ' '
 @ 13,52 get resp pict '!'
 read
 if resp $ 'YN'
  exit
 endi
endd
if resp = 'N'
 loop
endi
set devi to prin
@ 1,29 say 'DRUG USEFULNESS REPORT'
@ 2,29 say repl('=',22)
@ 4,10 say 'DRUG CODE: ' + mdcode
@ 4,36 say 'DRUG NAME:' + mdname
@ 5,9 say repl('-',62)
@ 6,8 say '¦'
@ 6,10 say 'S/NO'
@ 6,15 say '¦'
@ 6,18 say 'CODE'
@ 6,25 say '¦'
@ 6,30 say 'DESCRIPTION'
@ 6,48 say '¦'
@ 6,52 say 'DOSE'
@ 6,71 say '¦'
@ 7,9 say repl('-',62)
sno = 0
r = 7
do whil .not. eof()
 sno = sno + 1
 r = r + 1
```

```
    @ r,8 say '¦'
    @ r,11 say sno pict '99'
    mucode = ucode
    mudescr = udescr
    mdose = dose
    @ r,15 say '¦'
    @ r,17 say mucode
    @ r,25 say '¦'
    @ r,27 say mudescr
    @ r,48 say '¦'
    @ r,50 say mdose
    @ r,71 say '¦'
    skip
    if dcode < > mdcode
      exit
    endi
    r = r + 1
    @ r,8 say '¦'
    @ r,15 say '¦'
    @ r,25 say '¦'
    @ r,48 say '¦'
    @ r,71 say '¦'
  endd
  r = r + 1
  @ r,9 say repl('-',62)
  set devi to scre
  @ 10,22 clea to 14,56
  @ 10,24 to 14,55
  @ 11,26 say 'REPORT PRINTING IS COMPLETED'
  @ 13,29 say 'PRESS ANY KEY TO EXIT'
  set cons off
  wait
  set cons on
endd
clos all
```

```
eras temp2.dbf
clea
retu
```

REPORT3.PRG

```
sele a
 use drug
sele b
 use drugline
do whil .t.
 clea
 @ 0,7 to 24,72 doub
 @ 21,8 to 21,71 doub
 @ 1,24 say 'DRUGLINE REPORT PRINTING SCREEN'
 @ 2,24 to 2,54 doub
 mdcode = spac(8)
 @ 4,10 say 'DRUG CODE (Press <ENTER KEY> to exit):' get mdcode pict
'!!!/9999'
 read
 if mdcode = spac(8)
  exit
 endi
 sele a
 go top
 loca for dcode = mdcode
 if .not. foun()
  @ 23,23 say 'ILLEGAL DRUG CODE - Press any key'
  set cons off
  wait
  set cons on
  loop
 endi
 mdname = dname
```

```
@ 4,10 clea to 4,50
@ 4,10 say 'DRUG CODE:' get mdcode
@ 4,33 say 'DRUG NAME:' get mdname
clea gets
sele b
go top
loca for dcode = mdcode
if .not. foun()
  @ 23,20 say 'NO ENTRIES ON THIS DRUG - Press any key'
  set cons off
  wait
  set cons on
  loop
endi
@ 7,8 to 7,71
do whil .not. eof()
  mqsn = qsn
  mqdate = qdate
  menq1 = enq1
  menq2 = enq2
  mresp1 = resp1
  mresp2 = resp2
  mresp3 = resp3
  msource = source
  mresearch = research
  @ 6,10 say 'QUESTION NUMBER:' get mqsn
  @ 6,36 say 'QUESTION DATE:' get mqdate
  @ 8,10 say 'ENQUIRY: ' get menq1 pict '@!'
  @ 10,20 get menq2 pict '@!'
  @ 11,8 to 11,71
  @ 12,10 say 'RESPONSE:' get mresp1 pict '@!'
  @ 14,20 get mresp2 pict '@!'
  @ 16,20 get mresp3 pict '@!'
  @ 17,8 to 17,71
  @ 18,10 say 'SOURCE OF RESPONSE:' get msource
```

```
   @ 20,10 say "RESEARCHER'S NAME :" get mresearch
   clea gets
   @ 23,19 say 'TO SEND THIS DATA TO THE PRINTER (Y/N):'
   do whil .t.
    resp=' '
    @ 23,59 get resp pict '!'
    read
    if resp $ 'YN'
     exit
    endi
   endd
   if resp='Y'
    set devi to prin
    @ 1,26 say 'DRUGLINE REPORT'
    @ 2,26 say repl('=',15)
    @ 4,10 say 'DRUG CODE: '+mdcode
    @ 4,33 say 'DRUG NAME: '+mdname
    @ 6,10 say 'QUESTION NUMBER: ' + mqsn
    @ 6,36 say 'QUESTION DATE: ' + dtoc(mqdate)
    @ 8,10 say 'ENQUIRY: ' + menq1
    @ 10,20 say menq2
    @ 12,10 say 'RESPONSE:' + mresp1
    @ 14,20 say mresp2
    @ 16,20 say mresp3
    @ 18,10 say 'SOURCE OF RESPONSE:' + msource
    @ 20,10 say "PHARMACIST NAME :" + mresearch
    ejec
    set devi to scre
   endi
   skip
   if dcode<>mdcode
    exit
   endi
  endd
endd
```

```
clos all
clea
retu
```

REPORT4.PRG

```
use feedback
do whil .t.
  clea
  @ 0,4 to 24,75 doub
  @ 1,24 say 'FEEDBACK REPORT PRINTING SCREEN'
  @ 2,24 to 2,54 doub
  @ 22,5 to 22,74
  mhpno = spac(9)
  @ 4,6 say 'HOSPITAL NO (Press <ENTER KEY> to exit):' get mhpno pict
'99/999999'
  read
  if mhpno = spac(9)
    exit
  endi
  go top
  loca for hpno = mhpno
  if .not. foun()
    @ 23,22 say 'ILLEGAL HOSPITAL NO - Press any key'
    set cons off
    wait
    set cons on
    loop
  endi
  mdate = date
  mdateb = dateb
  mdater = dater
  mname = name
  mfreq = freq
```

```
mroute = route
msex = sex
mage = age
mdname = dname
muse = use
mdiag = diag
mlocate = locate
mdosage = dosage
madverse = adverse
mresp = resp
@ 4,60 say 'DATE:' get mdate
@ 6,6 say 'NAME OF PATIENT:' get mname pict '@!'
@ 8,6 say 'SEX:' get msex pict '!'
@ 8,17 say 'AGE:' get mage pict '99'
@ 8,29 say 'LOCATION (Enter "WARD" or "OPD"):' get mlocate
@ 10,6 say 'DIAGNOSIS:' get mdiag pict '@!'
@ 12,6 say 'NAME OF DRUG:' get mdname pict '@!'
@ 14,6 say 'DATE BEGUN'
@ 14,21 say 'DAILY DOSE'
@ 14,38 say 'FREQUENCY'
@ 14,51 say 'ROUTE OF ADMINISTRATION'
@ 15,7 get mdateb
@ 15,19 get mdosage pict '@!'
@ 15,38 get mfreq pict '@!'
@ 15,55 get mroute pict '@!'
@ 17,6 say 'USE OF DRUG:' get muse pict '@!'
@ 19,6 say 'ADVERSE REACTION:' get madverse pict '@!'
@ 21,6 say 'DATE OF REACTION:' get mdater
@ 21,37 say 'PHARMACIST NAME:' get mresp pict '@!'
clea gets
@ 23,19 say 'TO SEND THIS DATA TO THE PRINTER '
do whil .t.
  response = ' '
  @ 23,59 get response pict '!'
  read
```

```
    if response $ 'YN'
      exit
    endi
  endd
  if response = 'Y'
    set devi to prin
    @ 1,26 say 'FEEDBACK REPORT'
    @ 2,26 say repl('=',15)
    @ 4,6 say 'HOSPITAL NO: ' + mhpno
    @ 4,60 say 'DATE: ' + dtoc(mdate)
    @ 6,6 say 'NAME OF PATIENT: ' + mname
    @ 8,6 say 'SEX: ' + msex
    @ 8,17 say 'AGE: ' + mage
    @ 8,35 say 'LOCATION: ' + mlocate
    @ 10,6 say 'DIAGNOSIS: ' + mdiag
    @ 12,6 say 'NAME OF DRUG: ' + mdname
    @ 14,6 say 'DATE BEGUN: ' + dtoc(mdateb)
    @ 14,35 say 'DAILY DOSE: ' + mdosage
    @ 16,6 say 'FREQUENCY: ' + mfreq
    @ 16,35 say 'ROUTE OF ADMINISTRATION: ' + mroute
    @ 18,6 say 'USE OF DRUG: ' + muse
    @ 20,6 say 'ADVERSE REACTION: ' + madverse
    @ 22,6 say 'DATE OF REACTION: ' + dtoc(mdater)
    @ 22,37 say 'PHARMACIST NAME: ' + mresp
    ejec
    set devi to scre
  endi
endd
clos all
clea
retu
```

REPORT5.PRG

```
use indicate
sort on ucode to temp2
use temp2
do whil .t.
 clea
 @ 1,29 say 'REPORT PRINTING SCREEN'
 @ 0,27 to 2,52 doub
 @ 0,8 to 24,71 doub
 @ 22,9 to 22,70 doub
 mucode = spac(7)
 @ 4,10 say 'INDICATION CODE (Press <ENTER KEY> to exit):' get
mucode pict '!!!/999'
 read
 if mucode = spac(7)
  exit
 endi
 go top
 loca for ucode = mucode
 if .not. foun()
  @ 23,20 say 'ILLEGAL INDICATION CODE - Press any key'
  set cons off
  wait
  set cons on
  loop
 endi
 mudescr = udescr
 @ 6,10 say 'DESCRIPTION:' get mudescr
 clea gets
 @ 10,24 to 14,55
 @ 11,26 say 'Printing DRUG DISEASE REPORT'
 @ 13,27 say 'TO START PRINTING (Y/N):'
 do whil .t.
  resp = ' '
```

```
  @ 13,52 get resp pict '!'
  read
  if resp $ 'YN'
    exit
  endi
endd
if resp = 'N'
  loop
endi
set devi to prin
@ 1,30 say 'DRUG DISEASE REPORT'
@ 2,30 say repl('=',19)
@ 4,10 say 'INDICATION CODE:' + mucode
@ 4,38 say 'DESCRIPTION:' + mudescr
@ 5,8 say repl('-',63)
@ 6,8 say '¦'
@ 6,9 say 'S/NO'
@ 6,14 say '¦'
@ 6,17 say 'CODE'
@ 6,25 say '¦'
@ 6,30 say 'DESCRIPTION'
@ 6,48 say '¦'
@ 6,52 say 'DOSE'
@ 6,70 say '¦'
@ 7,8 say repl('-',63)
sno = 0
r = 7
do whil .not. eof()
  sno = sno + 1
  r = r + 1
  @ r,8 say '¦'
  @ r,11 say sno pict '99'
  mdcode = dcode
  mdname = dname
  mdose = dose
```

```
   @ 20,10 say "RESEARCHER'S NAME :" get mresearch
   clea gets
   @ 23,19 say 'TO SEND THIS DATA TO THE PRINTER (Y/N):'
   do whil .t.
    resp=' '
    @ 23,59 get resp pict '!'
    read
    if resp $ 'YN'
     exit
    endi
   endd
   if resp='Y'
    set devi to prin
    @ 1,26 say 'DRUGLINE REPORT'
    @ 2,26 say repl('=',15)
    @ 4,10 say 'DRUG CODE: '+mdcode
    @ 4,33 say 'DRUG NAME: '+mdname
    @ 6,10 say 'QUESTION NUMBER: ' + mqsn
    @ 6,36 say 'QUESTION DATE: ' + dtoc(mqdate)
    @ 8,10 say 'ENQUIRY: ' + menq1
    @ 10,20 say menq2
    @ 12,10 say 'RESPONSE:' + mresp1
    @ 14,20 say mresp2
    @ 16,20 say mresp3
    @ 18,10 say 'SOURCE OF RESPONSE:' + msource
    @ 20,10 say "PHARMACIST NAME :" + mresearch
    ejec
    set devi to scre
   endi
   skip
   if dcode<>mdcode
    exit
   endi
  endd
endd
```

```
    @ r,15 say '¦'
    @ r,17 say mdcode
    @ r,25 say '¦'
    @ r,27 say mdname
    @ r,48 say '¦'
    @ r,50 say mdose
    @ r,70 say '¦'
    skip
    if ucode<>mucode
      exit
    endi
    r=r+1
    @ r,8 say '¦'
    @ r,15 say '¦'
    @ r,25 say '¦'
    @ r,48 say '¦'
    @ r,70 say '¦'
  endd
  r=r+1
  @ r,8 say repl('-',63)
  set devi to scre
  @ 10,22 clea to 14,56
  @ 10,24 to 14,55
  @ 11,26 say 'REPORT PRINTING IS COMPLETED'
  @ 13,29 say 'PRESS ANY KEY TO EXIT'
  set cons off
  wait
  set cons on
endd
clos all
eras temp2.dbf
clea
retu
```