THE GHANA PHARMACEUTICAL JOURNAL

OFFICIAL ORGAN OF THE PHARMACEUTICAL SOCIETY OF GHANA

Volume 11 Nos. 1 – 2 January – June, 1988

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NATIONAL HEADQUARTERS OF THE PHARMACEUTICAL SOCIETY OF GHANA
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Contents

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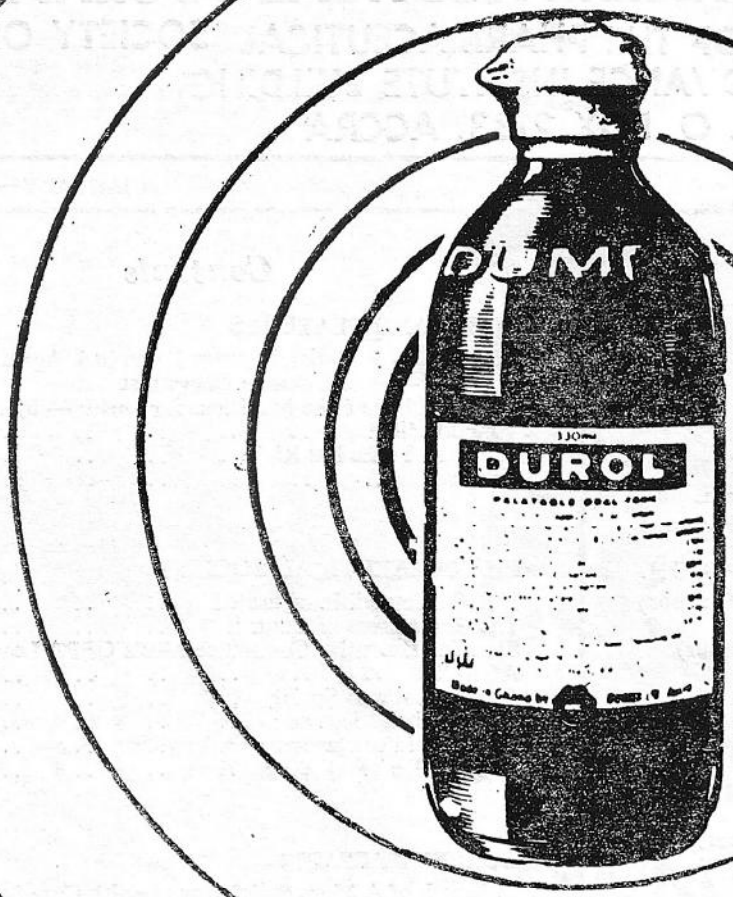

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Editorial

A National Drugs Committee Again

ONCE again a National Drugs Committee has been put in place. Its inauguration was performed by Nana Akuoko Sarpong, P.N.D.C. Secretary for Health, on April 20, who enumerated some of the functions and responsibilities of the Committee as follows:

1. To advise the Ministry of Health on matters related to a National Drugs Policy and the procurement of raw material for local production of essential drugs.
2. Development and periodic review of an Essential Drugs List and a National Formulary.
3. Objectively evaluate morbidity and mortality data, drug information and adverse reaction of drugs and other chemicals.

This, undoubtedly, should be good news to all concerned about the appalling way in which drugs are selected, procured, distributed and utilized in this country which invariably lead to wastage.

It is the hope of the *Ghana Pharmaceutical Journal* that unlike those before it, this Committee is destined to have a much longer lease of life. And indeed, to make this possible, it would be absolutely necessary that the Committee is given the required logistics and financial support.

It is also our hope that in their anxiety to streamline drug management in this country, our health authorities will not make a *faux pas* by assigning duties that are already fully catered for by law to this Committee.

We would like to seize the opportunity to remind members of the Committee of the onerous duty they have been charged with and to add that success in their work will depend, to a large measure, on their commitment to serve only the interest of the nation.

We wish the committee success.

The Essential Drugs List

MANY are those who have for sometime now been looking for a way to control the importation by government of so many different brands and types of drugs into this country considering the limited foreign exchange available to the state for use for the health sector each year.

With the launching of the Essential Drugs List (EDL) and National Formulary (NF) on June 9, in Accra, it looks like an answer to what appears to be a perennial problem is about to be found.

The EDL although presently only provisional, lists a limited number of drugs (by their generic names) that can be used to manage the most prevalent diseases in this country. The Ministry of Health will only import (by tender) and distribute drugs on this list and this measure, hopefully, should lead to the availability of basic drugs at affordable prices all the year round.

While we consider this policy commendable, we would caution those responsible for purchasing to be wary of unscrupulous manufacturers who may attempt to dump fake and sub-standard drugs on us.

In conclusion, we wish to call on all health workers, particularly pharmacists and doctors not only to help the National Drugs Committee to come out with a final list but also make sure that the idea behind the introduction of the list is realized.

Doctors blame fake Medicines for Death

by Mazher Mahmood Milan

FAKE British medicines produced by European drug firms are being blamed by doctors for the deaths and suffering of an untold number of patients throughout the Third World.

The lookalike medicines, which may contain only a fraction of the essential chemicals, can cause death by default.

Last week, a Sunday Times reporter was offered a range of counterfeit medicines — including antibiotics, steroids, analgesics and heart drugs-allegedly made by six British pharmaceutical companies. They were about 60 % cheaper than the genuine products.

The escalating trade in fake medicines is estimated to cost the British pharmaceutical industry more than £10m a year. However, companies such as Wellcome, Beechams and Glaxo are reluctant to discuss the problem openly for fear that publicity may cause concern among those taking their products and undermine sales.

The Sunday Times has tracked down one of the main sources of fake medicines. Within hours of arriving in Milan, a reporter posing as a pharmaceutical dealer was introduced to the world of drug counterfeiting.

At the plush offices of Res Pharma, a reputable Italian pharmaceutical company, Dr Agostino Facchini, the marketing manager, conceded: "Italy is the biggest supplier of medicines to the east, both legal and illegal. You can get any medicine you want here for a third of the price of the trade name products."

Facchini said that his company only supplied raw materials for medicines, but referred the reporter to three other companies that would all be willing to supply finished counterfeit products.

One, Farmaceutici Crovis, with laboratories in the Via Pogliaghi on the edge of Milan, specialises in producing copies of well-known drugs for Third World countries.

While it is legal to manufacture generic equivalents of registered drugs, it is an offence to sell them under their trade names. However, Ilse Peroni, 39, who runs Crovis, was willing to supply bulk quantities of "high-quality generic copies" embossed and packaged as original . She offered to fill capsules with inactive ingredients and make them look like the real products.

"The tablets will be exactly the same size and shape and you won't be able to tell the difference. Our capsules will match the colours of the originals exactly because we buy the blanks from the same companies," said Peroni. "I suggest you will be better buying generic equivalents, because then the medicines will be exactly the same."

After a tour of the laboratory, Davide Francessini, the manager, produced samples of counterfeit drugs and a price list. The medicines on offer included 100 tablets of Amoxil for £2.50 (real price £16.61); 100 Septrin, a Wellcome antibiotic, for £1.35 (£17.57); and 100 Glaxo Ceporex for £4.80 (£22.14).

Francessini said: "Our copies will be the best you can buy. We can do them for half these prices but the quality will be rubbish and they could be dangerous, which is why we generally prefer not to do it."

Crovis agreed to supply 1m tablets of each brand within six weeks. "You must pay an extra £1,500 for the printing of the boxes and for the name on the tablets to make them look real," added Francessini.

When a sample of tablets packaged by Crovis as "Flagyl 400" were analysed by May and Baker in London, they were found to contain just 232mg of metronidazole, the active ingredient, as compared to 400mg in the legitimate product. It took the fakes up to 105 minutes to dissolve compared with 15 minutes for the real tablets. This would render the medicine ineffective.

Zambon is one of Milan's largest pharmaceutical companies. At its extensive plant in Bressa, Guido Gnemmi, a salesman, provided the names of two middle-men who were willing to supply counterfeit drugs at wholesale prices.

Counterfeit medicines which have been detected include authentic-looking bottles of Wellcome's Neosporin eye drops, found in Nigeria, which could cause blindness. The fakes contained no polymyxin B sulphate, neomycin sulphate or gramicdin, but they did contain local tap water, which could harm infected eyes.

More than 15 versions of the antibiotic Terramycin, made by Pfizer, have been detected worldwide.

Paul Carratu, a private investigator employed by pharmaceutical companies, said: "This is the worst form of counterfeiting. With organised crime involved it is difficult to enlist the support of local police and authorities."

Editor's Note: This article was culled from the Sunday Tlmes (November 1, 1987) and we hope it will serve as food for thought not only for procurers and distributors of medicines but also for prescribers of same.

Some Ills To Be Put Right

RIGHT after assuming office, the present executive of the Society took upon themselves the task of touring the regions with a view to primarily learning at first hand problems facing pharmacists and those that affect the profession and to discuss practical ways of solving them.

At the time of writing this article, most of the regions had been visited and it is the intention of the writer to inform readers of some of the problems that came to light.

The Pharmacy Division of the Ministry of Health, it is believed, is inadequately staffed. Some opined that had there been enough pharmacists at Headquarters for one to solely see to manpower issues, the problem of long onset of payment of allowances to pharmacists doing their housemanship and also that of delays in receipt of appointment letters, and consequently salaries, by freshly qualified pharmacists wishing to work in the government hospitals would be eliminated.

Not enough pharmacists are at post in the public hospitals and this is obviously the result of poor conditions of service for pharmacists.

The inspection of pharmacy premises in the regions is poor due to logistic problems and lack of incentives to the regional inspectors.

In the private sector, conflict between proprietors and pharmacists are rampant. Proprietors do not honour promises made to pharmacists at the time of engagement; pharmacists are not adequately involved in selection and procurement of drugs and ethical dispensing by pharmacists, in some cases, is made difficult by proprietors who consider the monetary aspect of the practice more. Many held the view that pharmacists alone by law must own pharmacies just as clinics and law chambers are owned by doctors and lawyers respectively

To some the springing up of chemical sellers shops in urban areas, clustering of pharmacies within small areas and siting of chemical sellers shops close to pharmacies are menaces which need to be redressed.

Many were those who saw the illegal importation of sub-standard and fake drugs into the country as a "giant" problem.

As stated earlier, these are but a few of the many ills within the profession which need to be put right. It may interest you to know that the standing executive committee is slowly but surely working hard towards solving these problems. You may, very soon, be called upon to help in one way or the other and when that time comes just do your best.

LETTERS to the Editor

Pharmacy Awareness Campaign

Sir,

IT is shocking to learn how some people know so little about pharmacists and how the pharmacy profession relates to the medical profession on one hand and the chemical seller on the other.

Recently I was taken by surprise and somewhat angered when a well educated elderly man said, to him, pharmacists and chemical sellers are one and the same since they all sell drugs. There are still some who think the pharmacy profession is subordinate to the medical profession while others see pharmacists as doctors in charge of medicines.

To clear this confusion, wouldn't it be a wise move to start a kind of pharmacy awareness campaign to tell the public exactly who the pharmacist is and what his responsibilities are?

This campaign may come in the form of television adverts.

Afi Ocran (Mrs)
John Lawrence Chemists Ltd.
Accra.

* * *

Health Care Strategy Committee

Sir,

CONTRIBUTING to the National Health Symposium during its opening at the Kwame Nkrumah Conference Centre on June 7, Mr P.V. Obeng PNDC member and Chairman of the Committee of Secretaries requested participants to come out with proposals outlining specific responsibilites for public and private sectors and another outlining appropriate incentive packages for those prepared to invest in medical services.

These were meaningful and interesting requests made by the P.N.D.C member but I wonder if participants had time to consider these proposals. I think it is about time a permanent committee comprising representatives of all categories of health workers is formed to deal with such issues as they arise.

Such a committee would, among other things, undertake investigations into the future role of health care in Ghana and make recommendations on healthcare strategy in the private and public sectors. It would also promote cooperation and coordination within the two sectors.

George Lartey
Lorne Pharmacy Ltd.
Accra.

* * *

Regular But Not Punctual

Sir,

I WOULD agree that the *Ghana Pharmaceutical Journal* is now regularly coming out twice a year as agreed upon. But can one say is it punctual? I guess not, considering that one gets a June issue in September and a December issue in April the following year.

J. Sabblah
Ministry of Health
Koforidua.

1987 — 89 Council Inaugurated

AT exactly 9.45 a.m. on Saturday, January 16, the President-Elect of the Pharmaceutical Society of Ghana, Mr E.O. Gyamfi, declared open the inaugural meeting of the National Council of the Society held in the Conference Room of the Pharmacy Board.

After a short prayer by a member of the Council, Mr T.E.C. Sagoe, a Fellow of the Society, was requested to administer the Oath of Office to each member of the National Council present. This was splendidly done, of course, beginning with the President-Elect who looked impressive when the Golden Chain of Office was placed around his neck.

In an address, the President assured Council that he and his elected team were profoundly conscious of the great responsibilities attached to their various offices and pledged to approach their duties with humility and dedication, adding that "we earnestly and fervently hope and pray that we shall prove equal to the task."

Mr Gyamfi asserted that he and his elected colleagues would not only endeavour to be democratic, not swayed in their decisions by undue preference on the one hand or prejudice on the other but would also discharge their duties without fear or favour, malice or ill-will.

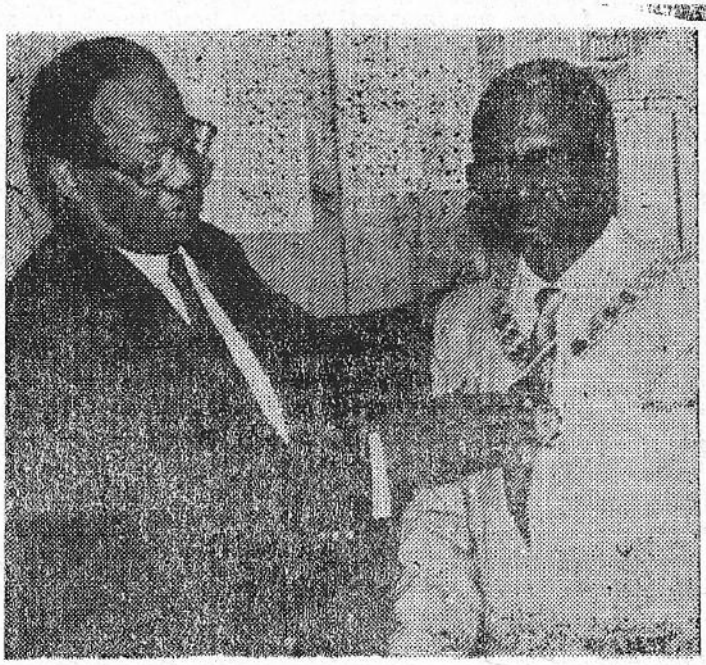
The President demanded from Council members ready acquiscence in majority decision, strict confidentiality, united front and collective responsibility.

He said under his leadership he would see to the re-organizing of the administrative structure at the Society's Headquarters to increase the responsibilities of the staff with a view to effectively assisting the Hon. General Secretary and the Hon. Treasurer in the performance of their duties.

Good relations, according to the President, would be maintained with the Ministry of Health, Pharmacy Board, other professional bodies in Ghana and international associations like the West African Pharmaceutical Federation (WAPF), Commonwealth Pharmaceutical Association (CPA) and later on with the International Pharmaceutical Federation (FIP) should our membership be restored.

Touching on Pharmaceutical Education, the President said the Society would continue to support the activities of the Faculty of Pharmacy in their attempt to improve pharmaceutical training and research in the country, adding that the Continuing Education programmes initiated by the Society would be maintained.

The enactment into law of the Draft Pharmacy Council Law and Drugs, Cosmetics and Poisons Law would be pursued while the Constitution, Bye-Laws and Code of Ethics of the Society would be reviewed, the President said.



The President of the Society, Mr Edward O. Gyamfi being decorated with the chain of office by Mr T.E.C. Sagoe, a fellow of the Society.

Three new implementation committees, according to the President, would be set up and these include (a) Legislation Committee, (b) Drug Information Committee and (c) Pharmaceutical Services Negotiating Committee.

The function of the Legislation Committee would be to review and enforce all existing and future laws affecting the profession.

The Drugs Information Committee would be charged with reviewing, from time to time the Ghana National Formulary and the Essential Drugs List. It would also liaise with the Pharmacy Board in the areas of registration of new products and premises.

The Pharmaceutical Services Negotiating Committee would be expected to deal with service conditions, welfare matters, complaints and grievances of pharmacists.

In conclusion, Mr Gyamfi appealed for co-operation from members, contending that this was required to achieve the set objectives of the Society.

Membership of the National Council of the Pharmaceutical Society of Ghana are as follows:

Mr E.O. Gyamfi	—	President of the Society and Chairman of the Council
Prof. R. Ansa-Asamoah	—	Vice President
Mr A.K.Y. Kokukokor	—	Hon. General Secretary
Mr Frank Boateng	—	Assistant Hon. General Secretary
Mr E.K. Addotey	—	Hon. Treasurer
Mr Oscar Bruce	—	Editor
Dr S.O. Larbi	—	Council Member
Mr T.T.L. Bernasko	—	Council Member
Prof. D. Dwuma-Badu	—	Dean, Faculty of Pharmacy, U.S.T, Kumasi
Mr M.A. Akiwumi	—	Greater Accra Regional Branch Representative
Mr E.N. Aheto	—	Greater Accra Regional Branch Representative
Mr M.K. Aboagye	—	Eastern Regional Branch Representative
Mr Rexford Sarfo-Mensah	—	Ashanti Regional Branch Representative
Mr T.A. Boamah	—	Brong Ahafo Regional Branch Representative
Mr M.K. Amoa-Ampah	—	Central Regional Branch Representative
Mr S.L.K. Akorlor	—	Volta Regional Branch Representative
Mr K.A. Ohene-Manu	—	Immediate Past President
Mr F.K. Bruce	—	Acting Director of Pharmaceutical Services, Ministry of Health, Accra
Mr S.A. Bentum	—	Western Regional Branch Representative
Mr Issaka Bado Abdel-Kassim	—	Northern/Upper East, Upper West Regional Branch Representative

The Committees of Council

THE Composition of the Standing Executive Committee (S.E.C.) of the Pharmaceutical Society of Ghana is as follows:

Mr Edward O. Gyamfi	—	President
Prof. R. T. Ansa-Asamoah	—	Vice President
Mr A.K.Y. Kokukokor	—	Hon. General Secretary
Mr Frank Boateng	—	Assistant Hon. General Secretary
Mr E.K. Addotey	—	Hon. Treasurer
Mr Oscar Bruce	—	Editor
Dr S.O. Larbi	—	Council Member
Mr T.T.L. Bernasko	—	Council Member

Whilst members of the above Committee were elected at the 39th Conference of the Society held at Christ the King Hall in Accra from October 22-24, 1987, those of the Committees that follow as well as representatives were appointed by the National Council of the Society in accordance with the Society's Constitution.

THE DISCIPLINARY COMMITTEE

Mr E.O. Gyamfi	—	Chairman
Mr K.A. Ohene-Manu	—	Member
Mr M.A. Akiwumi	—	Member
Mr M.S. Donkor	—	Member
Mrs Sarah Honny	—	Member
Maj. Joseph Appiah	—	Member
Dr Johnson K. Kwakye	—	Member
Mr A.K.Y. Kokukokor	—	Hon. General Secretary

FINANCE COMMITTEE

Mr E.O. Gyamfi	—	Chairman
Mr A.K.Y. Kokukokor	—	Member
Mr E.K. Addotey	—	Member
Mr Oscar Bruce	—	Member
Mr Eric N. Aheto	—	Member

EDITORIAL COMMITTEE

Mr A.K.Y. Kokukokor	—	Chairman
Mr J.N.N. Addo	—	Member
Mr Isaac Mensah	—	Member
Mrs Joyce Addo-Atuah	—	Member
Dr A.C. Sackeyfio	—	Member
Dr S.O. Larbi	—	Member
Mr Oscar Bruce	—	Member/Secretary

FELLOWSHIP AWARDS COMMITTEE

Prof. D. Dwuma-Badu	—	Chairman
Mr T.E.C. Sagoe	—	Member
Mrs E.R. Gavu	—	Member
Mr M.A. Akiwumi	—	Member/Secretary

EDUCATION COMMITTEE

Prof. D. Dwuma-Badu	—	Chairman
Prof. R.T. Ansa-Asamoah	—	Member
Mrs Elizabeth Anima Appiah	—	Member
Mr Michael A. Addo	—	Member
Mr Rexford Sarfo - Mensah	—	Member/Secretary

PROPERTY ACQUISITION COMMITTEE

Mr K.A. Ohene-Manu	—	Chairman
Mr E.O. Gyamfi	—	Member
Mr J. Pearce-Biney	—	Member
Mrs A. Brookman-Amissah	—	Member
Mr T.C. Corquaye	—	Member
Mrs Joyce Addo-Atuah	—	Member
Mr Joshua N.N. Addo	—	Member
Mr Moses Appiah	—	Member
Mr George Abu Boateng	—	Member/Secretary

LEGISLATION COMMITTEE

Prof. R.T. Ansa-Asamoah	—	Chairman
Mr S.S. Okunor	—	Member
Mr F.A. Jantuah	—	Member
Mr T.C. Corquaye	—	Member
Mr J. Atta Nyamekye	—	Member
Mr A.K.Y. Kokukokor	—	Member/Secretary

DRUG INFORMATION AND FORMULARY COMMITTEE

Dr S.O. Larbi	—	Chairman
Mrs Esther Osei	—	Member
Miss Constance Allotey	—	Member
Prof. R.T. Ansa-Asamoah	—	Member
Mr T.C. Corquaye	—	Member
Dr N.I.Y. Fiagbe	—	Member
Mr Derx Baffour	—	Member
Mr A.K.Y. Kokukokor	—	Member/Secretary

PHARMACEUTICAL SERVICES NEGOTIATING COMMITTEE

Mr J. Pearce-Biney	—	Chairman
Mrs Joyce Addo-Atuah	—	Member
Mr J.O. Kyei	—	Member
Mr J.R. Bart-Plange	—	Member
Mr S.K. Asiedu	—	Member
Mr T.T.L. Bernasko	—	Member
Dr A.C. Sackeyfio	—	Member
Mr Frank Boateng	—	Member/Secretary

Representatives of the Society on the Pharmacy Board include the following:

Prof. R.T. Ansa-Asamoah	—	Chairman
Mrs E.R. Gavu	—	Member
Mr M.A. Akiwumi	—	Member/Secretary

Persons to represent the Society on other Committees and bodies outside Council are as follows:

Steering Committee on Training of Dispensing Technicians

Prof. R.T. Ansa-Asamoah — Vice President

Representative on the Association of Recognized Professional Bodies

Mr E.O. Gyamfi	—	President
Mr A.K.Y. Kokukokor	—	Hon. General Secretary

Centre for Research into Plant Medicine

Prof. Kwame Sarpong (U.S.T.)

The President of the Society, Mr E.O. Gyamfi will represent the Society at meetings of the International Pharmaceutical Federation (F.I.P.), the Commonwealth Pharmaceutical Association (C.P.A.) and the West African Pharmaceutical Federation (W.A.P.F.).

Standing Executive Committee Meets GPPA Leaders

THE Standing Executive Committee (SEC) of the Society has met with leaders of the General Practice Pharmacists Association on April 22 to discuss some problems facing the association which incidentally form the biggest segment of the Society and to attempt to find solutions to those problems.

The Chairman of the Association, Mr E.N. Ayeh said they were troubled by the excessive yearly provisional income tax assessed on them and would appreciate the Society's help in that direction.

It was made known to the meeting that if companies could submit their audited accounts to the Internal Revenue Service (IRS) on time, they would be served with "actual', and not "provisional" income tax assessments. The President of the Society advised that General Practice Pharmacists should keep their books up-to-date by employing the services of reliable accountants. Mr Ayeh requested the Society to do something to spare them the trouble of having to pay double retailer's licence fees to the government. Hitherto, one is paid to the Pharmacy Board and another to the Internal Revenue Service.

Dissatisfaction was also expressed about the present import duty of 20% on drug importations. The Executive of the G.P.P.A. thought this was too high and was responsible for the high cost of drugs in the country.

Another matter that came up was the relationship between pharmacists and their proprietors. The meeting noted that often, proprietors did not fully honour contracts they entered into with pharmacists. They also refused to give pharmacists the free hand to run the shops professionally.

As a result of this, some pharmacists out of frustration, either went to work very late, vacated their shops for long periods during the day or even absented themselves for days. All these contributed, more often than not, to strained relations between proprietors and pharmacists.

The President advised that despite these set-backs supervising pharmacists should endeavour to be present during periods that their shops are opened in order to protect the lives of the people. The meeting agreed that ultimately pharmacy shops must be owned and run by pharmacists.

When it was suggested that some guidelines should be laid down to guide young pharmacists when they were negotiating with proprietors for employment, Mr Ayeh stated that his association had already set up a committee to draw up such

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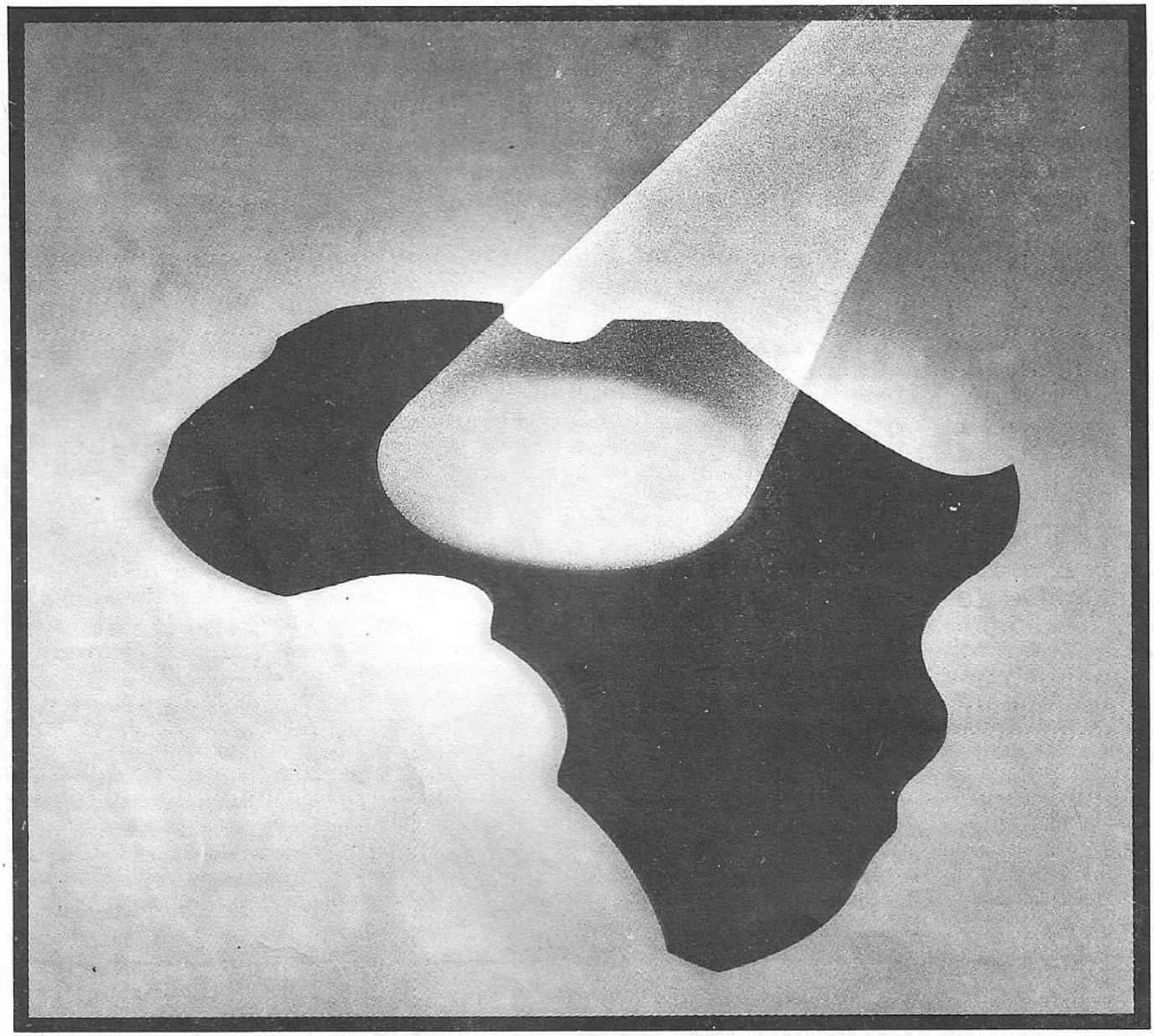

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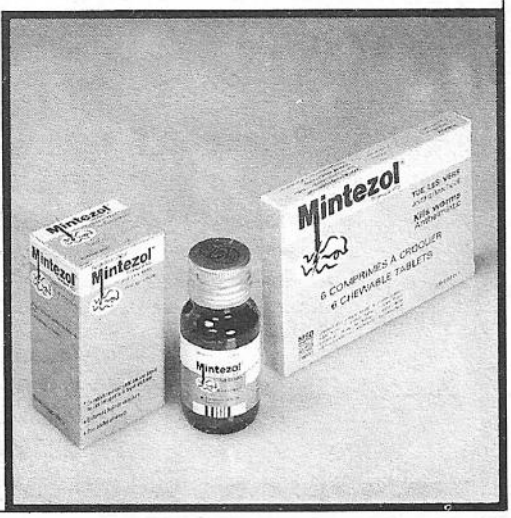

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a guideline. The S.E.C. requested that the report of the eommittee, when ready, be referred to it for perusal.

A. G. M. '88

THE 1988 Annual General Meeting (A.G.M.) will be held at Cape Coast in the Central Region from September 22-24 under the theme; "The Role of the Pharmacist in Primary Health Care Programme."

The Planning Committee for conferences at Headquarters consisting of the Hon. General Secretary (Mr A. K. Y. Kokukokor), his assistant (Mr Frank Boateng) and the Hon. Treasurer (Mr E. K. Adotey) will assist the Central Region Branch of the Society, whose Chairman is Mr M. K. Amoa-Ampah, to organise the meeting. The last time an Annual General Meeting was held in Cape Coast was in 1980.

CPA Donates to Society

THE Pharmaceutical Society of Ghana (PSGH) has taken delivery of back issues of the British National Formulary donated by the Commonwealth Pharmaceutical Association (CPA).

The back issues which number nine hundred were sent through the Ghana Library Board. The Society will retain 600 copies while the rest will be distributed to doctors, particularly those in the public sector.

It would be recalled that at the Fourth C.P.A. conference held in Nairobi in March last year, the provision of pharmaceutical reference books and back copies of journals for some developing countries was one of the various activities the CPA pledged to carry out.

Uncommitted Licences

THE Committee which was set up by Council at its inaugural meeting on January 16 "to provide guidelines for the registration of Pharmacy Shops, with particular reference to the utilization of Uncommitted Licences and to advice on the categories of persons who qualify to open or register the various types of premises" has presented its report to Council. Those with uncommitted licences, the Committee identified, fall into the categories listed below:

i) Teaching and Research

ii) Ministry of Health and related institutions

iii) Pharmaceutical Industry/Medical Representation

iv) Postgraduate Students.

The Committee recommended that holders of uncommitted licences in Teaching and Research should be actively encouraged to utilise them as this would, among other things, provide opportunities for lecturers to acquaint themselves with the practical aspects of their profession. However, to ensure better supervsion of premises other than their own, it was recommended that they are made to pair up. Postgraduate students were also expected to utilize their uncommitted licences as provided under this category.

Those with the Ministry of Health and related institutions were to be discouraged from the use of their uncommitted licences for political reasons. A discouragement the Committee felt, could "avoid the rampant but often unconfirmed allegations of drugs being diverted from hospitals to general trade or commerce."

"On the other hand", the commendation read, "since we recognise that they have uncommitted licences which otherwise would have been used, it is the view of the Committee that their employers should be urged by Society to pay them professional allowances in lieu of private practice."

The use of uncommitted licence falling under pharmaceutical industry and medical representation the Committee said, should only be permitted so long as it is not in conflict with employment terms of the individual.

The report reminded superintendent pharmacists of the essence of Section 17(b) of the Act saying "nobody should register and have open a premises if his other engagement or employment would not allow his physical presence on the premises, unless of course he has a locum at the premises."

In conclusion, the Committee recommended, aside those already mentioned, that every encouragement should be given to those with uncommitted licences wishing to operate their own shops.

The report was accepted by Council and the attention of the Pharmacy Board has been drawn to the recommendations.

Members of the Committee include; Mr K. A. Ohene-Manu (Chairman), Prof. R. Ansa-Asamoah, Dr S. O. Larbi and Mr Frank Boateng (Secretary.)

Getting Rid of Quacks

SOME Persons who claim to be practicing "Naturopathic" medicine but are in reality indiscriminately selling all sorts of orthodox medicines have been identified and handed over to the Police by a team of pharmacists headed by Mr Osei-Bonsu, the Deputy Director of Pharmaceutical Services for the Ashanti Region.

According to the spokesman for the team, Mr Ebo Aggrey, shops from which the defaulters were operating have been closed down and each offender was made to sign an undertaking not to engage in the practice again.

The team still goes round to make sure the shops are not re-opened.

About Folks

Harry is Back

Mr Harry Abutiate, one time Merck, Sharp and Dohme (MSD) Manager for Ghana, Liberia, Sierra-Leone and the Gambia but left for Nairobi, Kenya to manage the MSD East and Central African markets is back in Ghana, this time, as the MSD-Chibret Zone Manager for West

Africa.

Mr Abutiate, who was born on October 16, graduated with a Bachelor of Pharmacy Degree from the University of Science and Technology in June, 1969.

Before he left for Nairobi, Harry was an active member of the Pharmaceutical Society of Ghana. He was the Assistant Hon. General Secretary in 1976 and then the Hon. General Secretary from 1977-78. It was during this period that the "Pharmacy for Pharmacist" idea took root within the profession.

He was among the Ghana delegation that founded the West African Pharmaceutical Federation (WAPF) in Monrovia, Liberia in October, 1976.

Harry is married to Elizabeth and they have four children-Doris, Diana, Hans and Harriet.

Upjohn's Man for West Africa

THE new Upjohn Sales Supervisor for West Africa is Mr Charles Dontoh. Mr Dontoh is thus in charge of four English Speaking West African countries namely, Ghana, Liberia, Sierra-Leone and The Gambia.

Born on the 30th day of June, 1952 at Elmina, Charles had his elementary education in Sekondi and his secondary education at Aggrey Memorial Zion Secondary School in Cape Coast.

After graduating from the University of Science and Technology with a B. Pharm. (Hons) Degree in 1977, and completing a one year National Service at Effia-Nkwanta Hospital, he was employed at the Volta River Authority (VRA) Hospital at Akosombo in 1978.

Charles resigned from the VRA in 1981 to take up appointment as a Medical Representative with the Upjohn Company. By dint of hard work and dedication he was promoted to his present position at the beginning of this year. Mr Dontoh was the Assistant Hon. General Secretary of the Society from 1984 to 1985. He is married with three children and his hobbies are reading, music and watching films. We wish Charles tons of luck and success in his new position.

In Search of a more Satisfactory Health Care System

A two-day National Health Seminar has taken place at the Kwame Nkrumah Conference Centre, Accra, from June 7-8.

The seminar, themed "Search light on the Health Care Delivery System in Ghana: Achievements, Problems, Solutions and Prospects of Health for All by the Year 2000", was meant to pool talents and constructively come up with possible solutions that would help establish a kind of health system satisfactory to all Ghanaians.

Participants were thus drawn, not only from the various professions under the Ministry of Health but also from organizations and bodies outside the Ministry of Health but having a part to play in the provision of health.

The key-note address was taken up by Nana Akuoku Sarpong, the PNDC Secretary for Health, who commented on the poor supplier system within his Ministry saying "the estimation of our needs has not been accurate while there have been shortages in some areas, there has been wastage in others."

The Secretary attributed this undesirable situation to the cumbersome system of procurement the Ministry inherited coupled with inadequate funds.

He announced that as part of the efforts to streamline the entire health supply system the Ministry has drawn up and would soon launch an Essential Drugs List and National Formulary.

Nana Akuoku Sarpong also hinted that the Ministry of Health is considering the possibility of sub-contracting drug procurement to commercial concerns which will be responsible for port clearance and transportation of medical commodities to the regional centres.

He explained that if this could be done, the attendant long procedures of port clearance, payment of rent and demurrage, all of which contributed to wastage, would be avoided.

The Secretary observed that the heavy subsidy of health care delivery by Government was the result of constant shortage of vital items like gauze, cottonwool, satures, anaesthetic drugs and surgical gloves to mention a few.

The Secretary also noted with concern the shortage of pharmacists in the public sector.

Mr P.V. Obeng, PNDC Member and Chairman of the Committee of Secretaries charged participants to come out with proposals outlining specific responsibilities for both public and private sectors of health so that in areas where conflicts are absent, both sectors could pool resources for the benefit of the people.

Mr Obeng, who was himself a participant also called on his colleagues to formulate proposals spelling out appropriate incentive packages for persons prepared to invest in the medical sector to be incorporated into the Investment Code.

Contributing to the seminar, Mr Atta Nyamekye, Managing Director of Densu Industries Limited expressed his utter dissatisfaction at the total neglect of pharmacists within the public sector saying this has to a great extent contributed to the waste in the supply and distribution of drugs.

The President of the Pharmaceutical Society of Ghana, Mr E.O. Gyamfi although appreciated the idea of sub-contracting drug procurement to commercial concerns feared the practice would lead to escalation of drug prices.

Participants, in the course of the seminar, broke up into groups and deliberated in detail the manpower, management, procurement and finance aspects of health care delivery in Ghana with a view to bringing out appropriate recommendations for the Ministry of Health to consider and adopt.

E D L Launched

A provisional Essential Drugs List (EDL) and National Formulary has been launched in Accra on June 9, by the Ministry of Health. Ghana thus becomes the 37th African Country to come out with such a list in consonance with an idea brought forth by the World Health Organization (WHO) in 1977.

In an address, the PNDC Secretary for Health, Nana Akuoko Sarpong noted that although as high as 40 % of the nations health budget is spent on the procurement of drugs alone, intermittent drug shortages in government hospitals had persisted resulting in patients attending public hospitals having to procure their drugs from private pharmacies at high cost.

This situation, the Secretary observed, placed hardship on the people

who consequently have lost confidence in the health care delivery system.

According to the Secretary, it was against this background that the government invited WHO experts to assist in the drawing up of the EDL and National Formulary.

The E.D.L. is expected to contain as practicable as possible, the minimum number of drugs needed to manage most of the diseases prevalent in Ghana and unlisted drugs will not be stocked by the Ministry of Health.

It is hoped that with such a limited list, importation, storage and distribution of drugs in the country will be considerably improved thus leading to the availability of the most needed drugs all round the year at affordable prices.

The EDL will be provisional for the first year of its life and views and comments will be entertained within this period after which a final list will be made.

Designed to be a "living tool", even a final list of EDL will be regularly reviewed by the National Drugs Committee to meet the demands of changing times.

The launching of the EDL and National Formulary will also be done in other regional capitals.

Clearing Medical Stores of Expired Drugs

FOLLOWING reports of large quantities of expired drugs at the Central Medical Stores at Tema and other public health institutions in the country, the Ministry of Health has deployed six teams of experts to rid the system of all expired, deteriorated and unwholesome drugs and to find out the extent of wastage.

The teams would also carry out physical stock taking and open new ledgers at these institutions.

The Co-ordinator of the team is Prof. Boakye-Yiadom, a pharmacist and Pro-Vice Chancellor of the University of Science and Technology.

Sierra-Leone Hosts 6th Scientific Seminar

DELEGATES from all the member countries making up the West African Pharmaceutical Federation (WAPF) were present at the 6th Scientific Seminar of the Federation held in Freetown, Sierra-Leone from February 22 to 26.

Also present were the Executive Director of the West African Health Community, Dr A.K. Abashiya, the President of the Commonwealth Pharmaceutical Association (CPA), Mr Alfred Scales, the Vice President of the International Pharmaceutical Federation (FIP), Mr Sam E. Agboifo and representatives of the World Health Organisation (WHO), the United Nations Children Fund (UNICEF) and other international organisations.

The Seminar themed "Drug Utilization Trends in the West African Sub-Region" was declared open by the Sierra-Leonian Minister of Health, Dr Wiltshire Johnson.

The following observations and recommendations emanated from the deliberations of the seminar:

"Seminar noted with regret that the drug needs of the sub-region are inadequately met due to insufficient funds, whereas wastes of pharmaceutical resources resulting from irrational prescribing and dispensing, abuse of drugs, misguided importation, inadequate consultations with pharmacists on key drug matters and other factors further compound the problem. Seminar therefore recommended cost-consciousness among pharmacists, prescribers and drug administrators and also continuous consultation with pharmacists on all matters relating to drugs."

"In order to maximize savings on drugs, Seminar exhorted member countries to purchase their drugs by generic and not brand names, engage in international purchasing by bulk tendering for raw materials and finished products and limit drugs used to official formularies."

"Seminar urged pharmacists, as custodians of the people's drugs to endeavour to make genuine drugs readily available to all at affordable prices. This can be achieved by assu ring the quality of all drugs an improving drug economics in pr fessional practices."

"Members present recommende cost-recovery systems for drugs i the public sector as a way of ensurin continuous and adequate supply drugs at reasonable prices to th people. Methods of cost-recover should however be studied in mor detail with a view to finding practi cal means of effecting successfu systems in member countries."

"Seminar noted that better mana gement of drugs by pharmacists wi greatly improve drug use and reduc wastages. As accurate data on dru needs are essential for managin drug supply, seminar strongly recom mended to member countries sys tematic development of relevant dat on drug use, including consumptio and disease patterns and data base on professional services rendere by pharmacists."

Participants "recognised inade quate storage facilities for drugs a a major source of wastage and limitation to effective distribution Seminar therefore recommende provision of adequate storage facili ties at all levels of the drug distribu tion system."

"The presence in the sub-regio of a number of drugs banned i their countries of origin was a caus of concern to Seminar. Semina therefore called on governments t provide stricter measures to chec the importation of these drugs int the sub-region."

Noting with concern "the alarm ing rate at which fake and adultera ted drugs are now circulating withi the sub-region," seminar called o member countries "to step up con trol measures to prevent the importa tion, local manufacture and circula tion of fake pharmaceutical pro ducts."

"Seminar observed that there i misguided and excessive self-medi cation among people within the sub region thus increasing risk to health Seminar therefore recommended th stepping up of public enlightenmen

on how people can best employ self-medication for minor ailments."

Participants "considered the role of pharmacists in family planning and recognised the key responsibilities of pharmacists for custody, dispensing and counselling on family planning products and devices. Seminar therefore strongly encouraged pharmacists to update their knowledge and practices in this area with a view to exerting a positive impact on the success of family planning programmes in member countries".

"Seminar noted that national economic set-backs within the sub-region have reduced the viability of qualitative local production. Seminar therefore called on governments to encourage local production of essential drugs, especially within existing facilities, as an additional means of saving foreign exchange."

The potential of traditional and herbal medicines were recognised as means of augmenting national drug needs. Seminar therefore recommended that governments seek scientific means of taking advantage of this potential."

Abebreseh Passes Away

MR Daniel Abebreseh, the Acting Chief Director at the Ministry of Health has died in a motor accident on the Accra-Takoradi road on Friday, June 24. He was 45.

Dan, who left behind a wife and five children will be buried on Thursday, July 4 at Kokofu-Adwinasi.

The President and members of the Pharmaceutical Society of Ghana join with the bereaved family to mourn this outstanding son of Ghana who, among other things, appreciated the importance of all categories of health workers and therefore exhibited equal concern for the welfare of these various professions under the umbrella of the Ministry of Health.

We are confident that although Dan is no longer with us, the new management structures being put in place at the Headquarters of the Ministry of Health and in our public hospitals, the implementation of which he was so enthusiastic about, will eventually see the light of day.

May his Soul rest in peace.

WAPF's Postgraduate College is Born

THE Postgraduate College of the West African Pharmaceutical Federation (WAPF) has been inaugurated in Freetown, Sierra-Leone by the President of W.A.P.F. Mr T. Manly-Rollings.

The inauguration coincided with the 6th Scientific Seminar of W.A.P.F. which took place at the same venue from February 22 to 26.

Dr A.K. Abashiya, the Executive Director of the West African Health Community addressed the meeting. He highlighted on the objectives of the College which include, among other things, the following:

1) to advance education and training in all pharmaceutical disciplines at all levels;
2) to promote and maintain a high standard of professional practice;
3) to advance knowledge of the application of pharmacy in total health care; and
4) to promote and facilitate research into the practice of pharmacy.

The Executive Director commended W.A.P.F. for opting to have the College under the umbrella of the Federation rather than make it an autonomous body.

It was agreed that the College should honour and award 50 Founder Fellows during the 7th General Assembly of the W.A.P.F. to be held in Lagos, Nigeria from February 20-24, 1989. Formular for the distribution of the award among members states of W.A.P.F. took into consideration the number of pharmacists in each of the member states as well as their funding capacities. Thus, Nigeria with a pharmacist population of 3,500 will contribute half the required number. Ghana with 800 registered pharmacists is expected to name 15 recipients. Sierra-Leone and Liberia have pharmacist populations of 17 and 37 respectively but will contribute 4 recipients each. The Gambia with only five pharmacists will provide two out of the total number. Criteria to be used for selection of recipients in Ghana devised by the WAPF and the pharmaceutical Society of Ghana in outlined below.

i) pharmacists who have been registered for at least 15 years, 10 years of which must have been spent in a particular speciality and considered suitable for the award of a postgraduate diploma.
ii) pharmacists with postgraduate qualifications who have been registered as pharmacists for at least 10 years.
iii) applicants should have been members of the Pharmaceutical Society of Ghana with an umblemished character and who have made an outstanding and significant contribution to the advancement of pharmacy and of the Society in particular.

World Health Day Marked

THE Under Secretary for Health, Dr (Mrs) Mary Grant has launched the 40th Anniversary celebration of the World Health Day in Accra on April 7. The theme for the day which also marked the 10th Anniversary of the Primary Health Care (PHC) concept adopted at the Alma Mater conference in the Soviet Union was "Health for All—All for Health."

The day was also used to draw attention to the WHO resolution on "Tobacco or Health" which called on member states of the Organization to observe April 7 as "World No-Smoking Day" and to strenghen anti-smoking campaigns and health promoting initiatives.

Dr Grant reiterated the government's commitment to building a society in which every person born in Ghana would be as healthy as possible. She stressed, once again, the need for a continuous immunization of children against the six killer diseases and for an intensified health education campaign to enhance the physical, social and mental well being of the Society.

Malaria Vaccine Not for Africans

MALARIA Vaccine is unlikely to be a miracle cure for malaria in Africa where the disease is epidemic, health specialists have said during an international health conference held at Yamoussoukro in the Ivory Coast on March 31.

According to Dr Carlos Campbell, Head of the Malaria Programme for the U.S. Governments Centre for Disease Control (CDC), the need for a malaria vaccine in Africa was "to prevent tourists or soldiers, exposed for short periods, from getting malaria."

"It becomes considerably more difficult for the vaccine to be effective when you are continually living under conditions of malaria," he said. Vaccines against malaria, one of the most widespread of all tropical diseases, are under development with encouraging results although none is yet on the market.

Dr Edwin Beausoleil of the WHO African Regional Office in Brazzaville said chloroquine, one of the most widely used malaria medicines, was still the preferred treatment despite the spread of malaria parasites resistant to the drug.

"It still prevents deaths but it is now very important to assess response," he said. "As soon as there is the suggestion that a case is getting worse, it should be referred to a higher level for alternative treatment," he added.

Bid to Reduce Blindness Rate in Africa

A PROGRAMME aimed at reducing the prevalence of blindness by 50 per cent by the year 2000 have been drawn up in the country.

Dr (Mrs) Mary Grant, Deputy Secretary for Health, announced this in Accra on July 5 during the opening of a four-day Regional Workshop on prevention of blindness organized by the World Health Organization (WHO) and is expected to explore ways of strengthening training in eye-care at the primary, secondary and tertiary levels.

Dr Grant said the programme will integrate basic eye-care into the Primary Health Care (PHC) programme which would be extended to underserved areas through outreach services. The outreach services, she noted, would screen for cataracts cases and early detection of glaucoma and provide treatment for other eye conditions.

In a speech read for him, Dr S.L. Menekoso, WHO Regional Director for Africa, said the highest rates in blindness are found in Africa. According to him, surveys carried out indicated that the average blindness rate was about 1.2 per cent and that with a population of about 400 million, Africa had an estimated five million blind people. "This is not to mention the 25 million or so who are afflicted by low vision," Dr Menekosso added.

The Regional Director said WHO member states were calling for resolute measures to reduce this scourge to the minimum levels and urged the participants to work towards that.

Thirty participants from 15 African countries including Ghana, Bostwana, The Gambia, Kenya, Malawi, Liberia, Mauritius, Namibia, Seychelles, Sierra-Leone and Zimbabwe took part in the workshop.

World AIDS Day

THE World Health Organization (WHO) has declared December 1, 1988 as World AIDS Day. Ministers of Health of all nations are expected to proclaim in their respective countries under the theme "Tell the world what you are doing about AIDS."

According to a statement issued by the Organization, the objective of the World AIDS Day will be to tell people everywhere that AIDS can be stopped worldwide and to convince people that their responsible behaviour can protect them and stop the spread of AIDS.

The day will also encourage compassion and understanding towards those who have AIDS, highlight the extraordinary range of scope of the fight against the disease all over the world and support for prevention and control programmes everywhere.

WHO estimates that about five to 10 million people are presently infected by the HIV virus and 43 African countries had reported the presence of 11,000 AIDS cases on their territories. It is worthy to note that WHO spent 24 million dollars in AIDS prevention measures last year and has budgeted about 66.2 million dollars for the current year.

Korle-Bu Pharmacy Dep't. Now Operates 24hr Service

THE Pharmacy Department of the Korle-Bu Teaching Hospital has since May this year been operating a 24 hour service in line with the present policies of the Ministry of Health.

A Pharmacist on duty I had a chat with expressed a strong conviction that the move was a step in the right direction adding that "me and my colleagues have already adjusted to the new condition and we hope that steps will be taken to compensate us for the extra work we are doing like is the case with other health workers."

Andrenoceptors, Pulmonary Circulation and Pulmonary Compliance in the Anaesthetized Cat

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Summary

IN asthma, the salutary effect of bronchodilators derives from their decreasing pulmonary resistance which is invariably, accompanied by an increase in pulmonary compliance. In an anaesthetized cat in a state of experimentally-induced broncho-constriction, bronchodilators cause a decrease in pulmonary resistance and an increase in pulmonary compliance. The effects of bronchodilators are accompanied by changes in systemic and pulmonary arterial pressure. Drug-induced changes in the diastolic pulmonary pressure of such a cat were found to be associated with opposite changes in pulmonary compliance. However, no clear-cut inter-relationship could be drawn between changes in pulmonary compliance and concomitant alterations in pulmonary vascular pressure. This suggests that additional factors may play a part in drug-induced changes in pulmonary compliance.

Introduction

The bronchodilator effects of the sympathomimetic amines—manifested in their reduction in pulmonary resistance and increase in pulmonary compliance in an asthmatic condition—is attributable to the mediation of their pharmacological action through B-adrenoceptors. Whereas there is evidence for the involvement of B_2-adrenoceptors in reduction in airways resistance, the involvement of B-adrenoceptors in the increase in pulmonary compliance is not clearly established. Airways resistance is the change in driving pressure per unit change in air flow or the degree of obstruction offered by the conducting airways to airflow; pulmonary compliance, on the other hand, involves the distensibility of the peripheral airways, that is, it is the change in lung volume per unit of pressure change.

This experiment aims to investigate the relationship that may exist between the effects of various drugs on pulmonary compliance and pulmonary arterial pressure and, to determine to what extent the adrenoceptor types in the pulmonary vessels may affect their alterations in pulmonary compliance. Evidence so far accumulated has indicated the presence of a predominantly alpha-adrenoceptor population in the pulmonary circulation in the dog, rabbit, pig, calf, guinea-pig and man (1,2,3,4) which mediate vasoconstriction. More yet is to be known about the adrenoceptor population in the pulmonary vessels of the cat. Although much pharmacological information on extrapulmonary blood vessels has recently become available from which some generalizations may be made, it is worthy of note that blood vessels are highly heterogenous in their response to drugs (5,6). Thus, Williams (7), Bevan (8), Buffolo and Waddel (9), and Misu, Kaiho, Ogawa and Kubo (10) also noted the heterogeneity of various mammalian vascular vessels in their response to sympathomimetic amines. Experimental results from *in vitro* work could permit only limited prediction of pharmacological characteristics of a short segment of a blood vessel, much less of an entire vascular system.

An increase in pulmonary compliance is known to decrease pulmonary vascular pressure and vice versa(11). If the pulmonary vessels in the cat have any appreciable B-adrenoceptor population, then it is conceivable that the B-adrenoceptor agonists and antagonists would have an indirect effect on pulmonary compliance by their action on pulmonary vascular pressure.

Materials and Methods

General

The experiments were performed on four adult cats of either sex which were anaesthetized by an intraperitoneal injection of a mixture containing-chloralose 80 mg/kg and sodium pentobarbitone 6 mg/kg. The trachea was cannulated and systemic arterial pressure was monitored from a cannulated common carotid artery by means of a Statnam (Model P23AC) pressure transducer. Heart rate was recorded in all the cats by means of a Grass (model 7P4C) tachograph triggered by the systemic arterial pressure. The cats were bilaterally vagotomized.

All records were made on a 6-channel Grass Curvilinear polygraph (model 7). In all experiments,

drugs were injected through a cannula in a femoral or brachial vein.

Pulmonary Artery Pressure

The thorax was opened by making a slit through the chest wall at the level of the second or third intercostal space. The heart was shelled from its pericardium and, to measure pulmonary artery pressure, a 13g. hypodermic needle, attached via a short length of a polythene cannula to a Statham (model P23AC) pressure transducer, was inserted into the pulmonary artery at its point of origin from the right ventricle.

Pulmonary resistance and compliance

The method used was based on the concept first described by Neergard & Wirz(12) and later modified by Mead & Whittenberger (13), Amdur & Mead(14), Colebatch, Olsen & Nadel(15) and Diamond(16, 17).

The cats were artificially ventilated by positive pressure at a frequency of 27-30 breaths per minute, and a stroke volume of 13 ml/kg. body weight using a Palmer Ideal pump. Airflow was measured using a pneumotachograph (Mercury Electronics F2—12mm) coupled to a Statham differential pressure transducer (model PM 5). Transpulmonary pressure was measured by connecting one inlet port of a Statham differential pressure transducer (model PM 5) to a 13g. hypodermic needle which was inserted into the side arm of the tracheal tube by means of a polythene tube. Since the chest was open the intrathoracic pressure was considered to be atmospheric.

Tidal volume was obtained from the electronic integration of the flow signal by a Gıass (model 7P10) integrator. All three parameters, that is, transpulmonary pressure, rate of airflow and tidal volume, were recorded simultaneously.

Method of Analysis

Pulmonary resistance was calculated from the airflow and transpulmonary pressure records at isovolumic points on the tidal volume trace as described by Amdur & Mead(14). The calculation was based on the airflow and the component of the transpulmonary pressure required to overcome flow resistance near peak inspiratory and expiratory flow rates.

The calculation of pulmonary compliance was also based on the method of Amdur & Mead(14). In this instance, it is assumed that at the beginning and end of inspiration, no air is being moved either into or out of the respiratory system and under static conditions the flow-resistive forces are inoperative; any change in transpulmonary pressure, therefore, must relate to the elastic forces alone.

Procedure

Cumulative doses of 5-hydroxytryptamine were injected through the brochial vein and the effect was noted on the systemic arterial blood pressure, heart rate, diastolic pulmonary artery pressure, transpulmonary pressure, airflow and tidal volume. The injection was continued until about 5-8mmHg increase in diastolic pulmonary artery pressure was obtained. Maximum increase in diastolic pulmonary artery pressure was not possible as this would cause occlusion of blood to the lungs, alveolar collapse and eventual death of the animal. Next, isoprenaline (a non-selective B_1, B_2- adrenoceptor agonist) was infused through the femoral vein at the rate of 0.5 ug/kg/min. and, at a stable heart rate, cumulative doses of 5-hydroxytryptamine were injected. Both isoprenaline infusion and 5-hydroxytryptamine administration were stopped when about 5-8mmHg increase in diastolic pulmonary artery pressure was obtained. Rimiterol (a selective B_2-adrenoceptor agonist) infusion at the rate of 0.25 ug/kg/min. was made in place of isoprenaline and the 5-hydroxytrytamine doses were again injected cumulatively. The doses of isoprenaline and rimiterol were chosen after several trials to determine suitable doses that could antagonise the effects of 5-hydroxytryptamine on all parameters. An interval of about one hour was allowed between successive procedures to enable the various parameters to recover fully from the effects of 5-hydroxytryptamine.

Practolol (a selective B_1-adrenaceptor antagonist) 0.5 mg/kg was injected, followed, after ten minutes, by the isoprenaline infusion and 5-hydroxytryptamine injection. Rimiterol was also used in place of isoprenaline. In a similar way, the effect of butoxamine (a selective B_2-adrenoceptor antagonist) 5 mg/kg was investigated on the isoprenaline and rimiterol infusions during the injection of 5-hydroxytryptamine administered cumulatively.

Culmulative dose-response curves to histamine and noradrenaline were also obtained on the systemic arterial pressure, heart rate, pulmonary artery pressure, transpulmonary pressure, airflow and tidal volume. The effect of propranolol 1.5mg/kg was also observed on all the parameters.

Unless otherwise stated, the drug doses in these experiments refer to the bases. Stock solutions in all experiments were freshly prepared in 0.9%w/v acid saline (pH-4.0) and diluted with normal saline.

Result

Typical effect of 5-hydroxytryptamine on the various parameters are shown in *Fig.* 1. (*See page* 15)

Diastolic Pulmonary Artery Pessure and Pulmanary Resistance and Compliance

5-hydroxytryptamine caused an increase in diastolic pulmonary pressure, pulmonary resistance and a decrease in pulmonary compliance. Dose-dependent curves were obtained for diastolic pulmonary artery pressure, and pulmonary resistance and compliance. *Fig.* 2 shows the dose-response curves to 5-hydroxytryptamine on the cat diastolic pulmonary artery pressure in the presence of isoprenaline, rimiterol, and practolol. Similar curves to the same agent and relaxants in the presence of butoxamine were also obtained. Whereas the effect of isoprenaline was consistent in both cases in that the drug produced a rightward shift of the 5-hydroxytryptamine curves, rimiterol produced a rightward shift of the 5-hydroxytryptamine curve in one case (*Fig.* 2) and a leftward shift in the other. The effects of isoprenaline and rimiterol on the diastolic pulmonary artery pressure were not diminished by practolol (*Fig.* 2) but the effect of isoprenaline on this parameter was reversed by butoxamine.

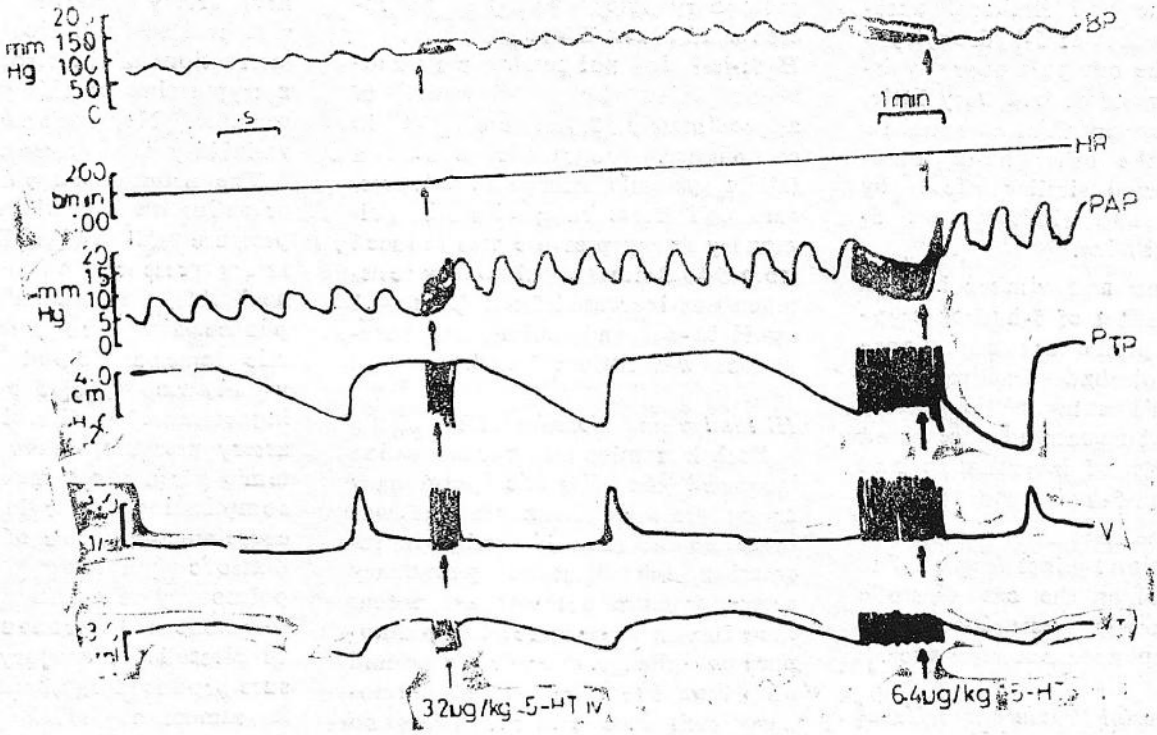
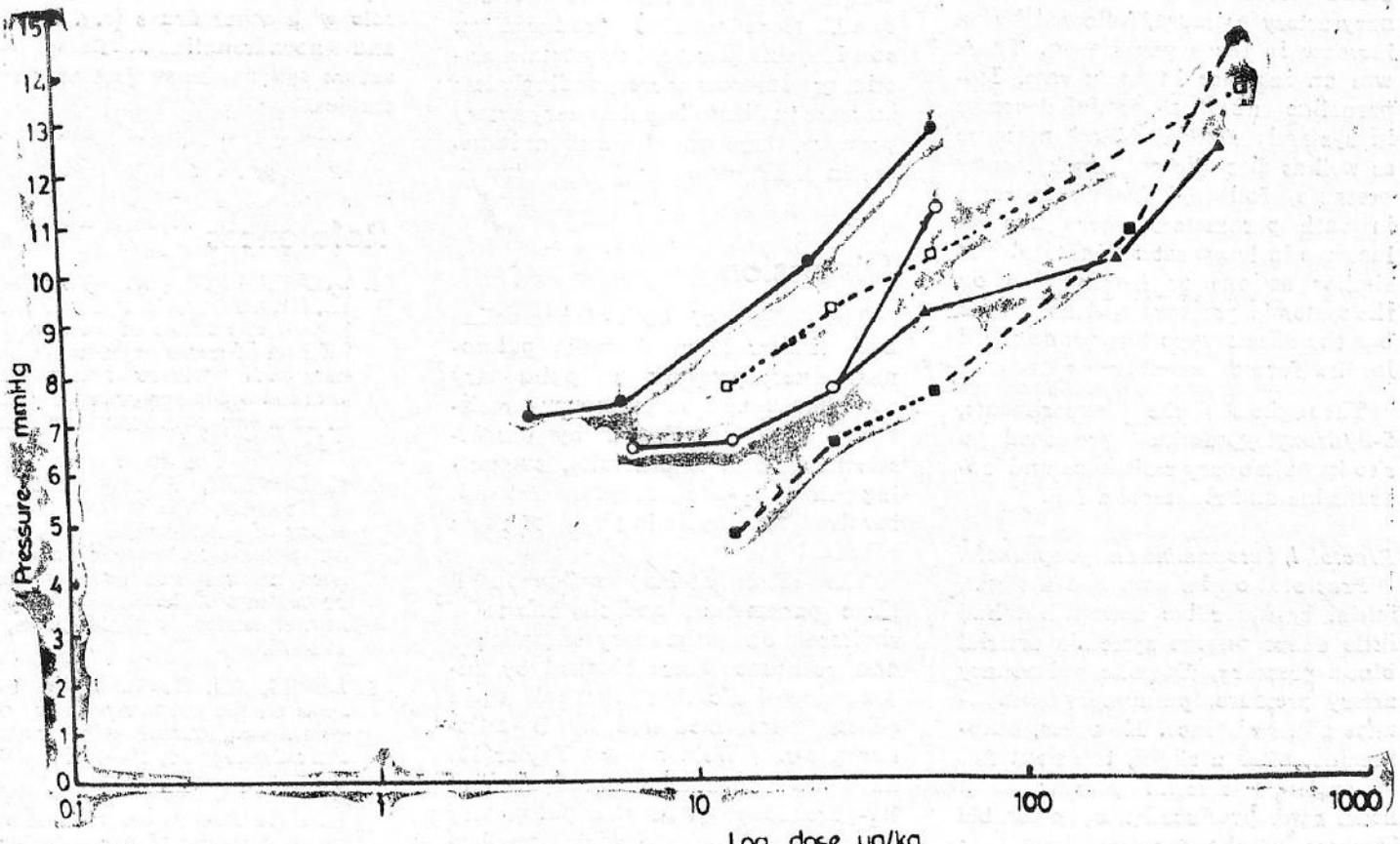


Fig. 1 The effects of 5-Hydroxytryptamine (5HT) injected intravenously on, reading from the top downwards, blood pressure (BP) heart rate (HR), Pulmonary Artery Pressure (PAP), Transpulmonary Pressure (PTP), airflow (V) and tidal volume (VI). In this experiment, the cat was bilaterally vagotomised. The chart speed was increased at two points; the first during the control period and the second at the height of the 5-HT effect. 5-HT produced a rise in pulmonary arterial pressure and heart rate. Transpulmonary pressure was increased whilst airflow decreased. Tidal volume was relatively unaffeted.



16.2 CUMULATIVE DOSE-RESPONSE CURVES TO 5-HYDROXYTRYPTAMINE (●) ON THE DIASTOLIC PULMONARY ARTERY PRESSURE IN THE PRESENCE OF ISOPRENALINE (■) RIMITEROL (○) ISOPRENALINE + PRACTOLOL (▲) AND RIMITEROL + PRACTOLOL (□)

Isoprenaline and rimiterol antagonized the effect of 5-hydroxytryptamine on the cat pulmonary resistance and practolol had very little, if any, effect on this antagonistic action. On the other hand, butoxamine reversed similar effects by isoprenaline and rimiterol on 5-hydroxytryptamine.

Isoprenaline and rimiterol antagonized the effect of 5-hydroxytryptamine on pulmonary compliance and practolol had practically no effect on this antagonistic action. However, butoxamine reversed similar effects of isoprenaline and rimiterol on 5-hydroxytryptamine.

Butoxamine showed a greater antagonistic action against isoprenaline than rimiterol on the cat diastolic pulmonary artery pressure and pulmonary compliance and resistance.

Systemic Arterial Pressure and Heart Rate

All the above changes were accompanied by changes in the systemic blood pressure and heart rate. 5-hydroxytryptamine produduced an initial decrease in systemic blood pressure and diastolic pulmonary artery pressure, followed by an increase in these parameters. There was an increase in heart rate. Isoprenaline caused an initial decrease in systemic arterial blood pressure as well as diastolic pulmonary artery pressure, followed by an increase in both parameters; there was an increase in heart rate. Rimiterol had similar actions as isoprenaline on the systemic pressure and heart rate but the effects were less pronounced in the former case.

Throughout the experiments, 5-hydroxytryptamine produced a rise in pulmonary resistance and isoprenaline and rimiterol a fall.

Practolol, butoxamine and propranolol

Practolol on its own had a slight, initial bradycardiac action but had little effect on the systemic arterial blood pressure, diastolic pulmonary artery pressure, pulmonary compliance and resistance. However, butoxamine, after a slight, transient fall in systemic arterial pressure and heart rate, produced a considerable increase in the former; there was little change in heart rate. On the average, butoxamine produced a rise of about 1.3 mmHg in diastolic pulmonary artery pressure, an increase of about 25cm.
$H_2O l^{-1} s^{-1}$ in pulmonary resistance accompanied by a decrease of approximately 2.3ml cmH_2O-1 in compliance. Propranolol caused a fall in systemic arterial blood pressure and heart rate; diastolic pulmonary artery pressure was reduced from 5 to 3mmHg, pulmonary resistance was increased from 3.8 to 4.1 $cm.H_2O$1-s-1 and pulmonary compliance was little affected.

Histamine and Noradrenaline

Both histamine and noradrenaline increased the diastolic pulmonary artery pressure. Noradrenaline was more potent than histamine in increasing the diastolic pulmonary artery pressure but was less potent than the latter in increasing pulmonary compliance. Noradrenaline had only little effect on the cat pulmonary resistance and much less so in decreasing pulmonary resistance and its action on pulmonary compliance was negligible. Histamine generally produced a decrease in systemic arterial pressure, followed by a slight increase and then a decrease again; heart rate was little affected. Noradrenaline produced a considerable increase in Systemic arterial pressure but correspondingly less increase in diastolic pulmonary artery pressure, there was also a slight increase in heart rate.

Discussion

The effect of both isoprenaline and rimiterol on diastolic pulmonary artery pressure, on pulmonary compliance and on pulmonary resistance were unaffected by cardioselective doses of practolol, suggesting that B_1-adrenoceptors are not involved in mediating any of these effects.

The effects of isoprenaline on all three parameters, and the effects of rimiterol on pulmonary compliance and resistance were blocked by butoxamine indicating that all these effects were mediated by B_2-adrenoceptors. Weiner & Taylor(18) have reported a mixture of A- and B_2-adrenoceptors in the pulmonary arterioles of man which mediate vasoconstriction and vasodilatation respectively. However the effect of butoxamine on the diastolic pulmonary artery pressure response to rimiterol was not blocked, and the interactions of rimiterol and 5-hydroxytryptamine on this parameter was variable. No explanation of this variability is apparent.

The pronounced effects of noradrenaline on systemic arterial blood pressure and on diastolic pulmonary artery pressure contrasted with its, negligible effect on pulmonary compliance. Since drug effects on systemic arterial blood pressure are usually accompanied by corresponding changes in diastolic pulmonary artery pressure, changes in the systemic circulation may be another complicating factor in attempts to correlate the effects of alteration in diastolic pulmonary pressure on pulmonary compliance. It is difficult to reconcile the pronounced increase in diastolic pulmonary artery pressure produced by noradrenaline with its almost negligible effect on pulmonary compliance. In conculsion, the results suggest that while changes in pulmonary compliance may be secondary to changes in pulmonary artery pressure with some drugs (e.g. isoprenaline), as yet undetermined other factors may play a role with other drugs (e.g. rimiterol and noradrenaline). These other actors will be the subject of further studies.

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The Effects of Disease on Drug Disposition

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Introduction

CLINICAL Pharmacology has been defined as the scientific study of drugs in man and it is in the setting of the disease state that this science must ultimately be applied. Techniques for drug assay, tissue response elucidation and the determination of other important pharmacological variables have resulted in better understanding of the mechanisms of action of drugs and the way these agents are handled in the body.

This paper reviews the results of the application of these methods to study the effects of disease on drug disposition. This area of study is an important and ever expanding research interest of Clinical Pharmacologists and Clinical Pharmacists worldwide. The emphasis has been rightly placed since the information that is emerging not only improves prescribing practice but refines the art and science of drug use in therapeutics.

Pathological States

The pathological conditions considered in this review include:

1. Liver disease
2. heart failure
3. Kidney failure and
4. other disease states affecting gastrointestinal motility.

Liver Disease

The liver is the main organ involved in drug metabolism. Liver disease should thus be expected to affect the way drugs are handled. It must also be noted that liver disease must be fairly extensive before abnormal drug metabolism occurs. Most of our patients are however seen with extensive liver disease because they present to hospital late. What are the effects of the liver pathology on the drugs we administer to them?

Liver disease does not impair the metabolism of all drugs to the same extent and it may be difficult to extrapolate from knowledge of the handling of one drug to another(1). This is because of the heterogeniety inherent in the different forms of Cytochrome P450 we possess. Some of these may act on different substrates and may be differently affected by hepatocellular dysfunction.

An example involves the hepatic hydroxylation of antipyrine and phenytoin. In cirrhosis, only the metabolism of antipyrine is affected.

Drugs may be classified into two main groups on the basis of their hepatic clearance—(*a*) high clearance and (*b*) low clearance characteristics. The ability of the liver to eliminate high clearance drugs after parenteral administration is dependent on the amount of blood flow to the liver.

Reduction in hepatic blood flow as may occur in heart failure will lead to reduced clearance of some drugs (*Table I*). Low clearance drugs are dependent on the intrinsic Metabolizing ability of the liver and will be more affected by disease of the liver parenchyma. (2)

TABLE I.

Drug Clearance and Liver Disease (2)

Low clearance drugs	High clearance drugs
Diazepam	Lignocaine
Ampicillin	Labetalol
Penicillin	Propranolol
Prednisolone	Pethidine
Theophylline	Chlormethiazole

Protein binding

Plasma protein binding of drugs is altered in liver disease. The free fraction of the oral hypoglycaemic agent, tolbutamide is increased by as much as 115% in cirrhosis and that of phenytoin by up to 40%. These facts become important when we prescribe for patients with diabetes mellitus and seizure disorders. This also explains the increased incidence of adverse reactions associated with plenytoin in liver disease.

It has also been documented that the dose of diazepam needed to produce sedation for endoscopy is less in cirrhotics than those with normal liver function. (3).

Portal hypertension

Portal hypertension occurs in liver disease. This results in oedema and structural abnormalities of the small intestinal mucosa. These changes are marked enough to alter drug disposition and absorption from the gut may be delayed.

Patients with hepatosplenic schistosomiasis show an increased incidence of central nervous system side effects from Niridazole. This has been attributed to elevated drug levels resulting from shunting of portal blood away from hepatic metabolism. The portocaval anastomosis that is established allows passage of orally administered drugs directly into the systemic circulation. This prevents hepatic first pass metabolism from reducing drug bioavailability. We have begun to see patients with S. Mansoni infestation in Ghana and Clinicians should remember these facts when dealing with such patients.

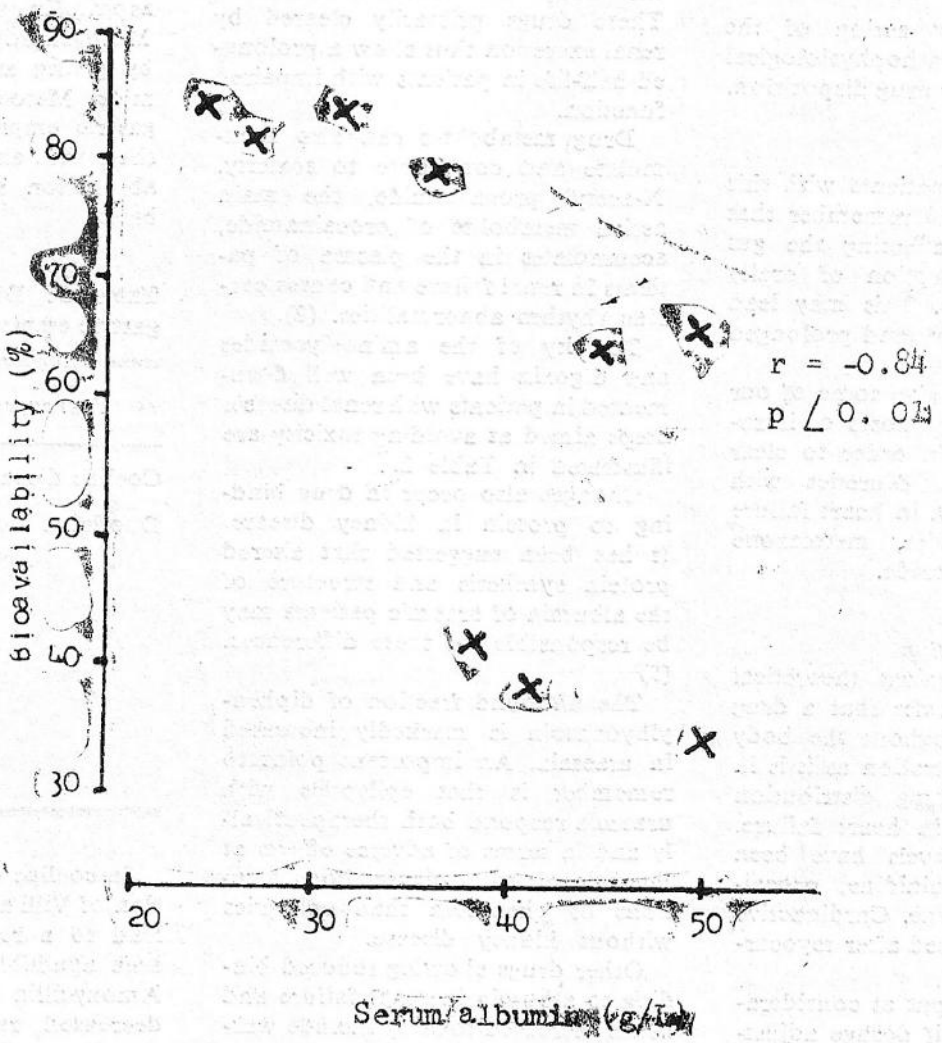
Practical Implications

The ideal situation would be for the Clinical Pharmacologist or Clinical Pharmacists to be knowledgeable to the extent of predicting dosage requirements for a patient with a given degree of liver damage. Research in this direction is still rudimentary. Some markers may however be used albeit with caution:

Albumin

In chronic liver disease serum albumin is the most useful index of hepatic drug metabolising activity. This is because a low albumin level reflects depressed synthesis of hepatic proteins, most importantly those involved in drug metabolism. See *Figs* 1.

Figure 1.



It has been difficult to establish a direct relationship between prothrombin time and drug clearance for all patients and this index may not be too helpful.

We should also be aware of the secondary effects of the liver disorder on other vital organs. The brain is extremely sensitive to centrally acting drugs in chronic liver disease. Coma is easily precipitated by non-therapeutic amounts of such drugs. (3)

It is only when Pharmacists and Clinicians are fully aware of the possibility of adverse drug effects from altered drug disposition in such disease states can a meaningful approach to therapy be adopted. Therapeutic drug monitoring and the use of agents eliminated via other routes offer management options in patients suffering from chronic liver disorders.

Cardiac Failure

Impaired 'pump' action of the heart results in pathophysiological changes which alter drug disposition.

Mucosal oedema

In prescribing for patients with this condition we should remember that mucosal oedema affecting the gut wall impairs absorption of orally administered drugs. This may lead to therapeutic failure and prolonged stay in hospital.

We have had to give some of our patients intermittent doses of intravenous frusemide in order to clear 'resistant' oedema. Diuretics with impaired absorption in heart failure include the thiazides, metolazone and hydrochlorothiazide.

Volume of distribution

This is a convenient theoretical concept which assumes that a drug is distributed throughout the body in the same concentration as it is in the plasma. (4) Drug distribution becomes modified in heart failure. Elevated plasma levels have been documented for quinidine, procainamide and lignocaine. Cardioactive drugs likely to be used after myocardial infarction.

Patients may be put at considerable risk of toxicity if dosage adjustments are not properly made. The apparent volume of distribution of the drugs are significantly reduced in heart failure. Drugs with a big volume of distribution have most of the drug load bound to the tissues. Drug elimination in heart failure is also reduced. This occurs because there is reduced blood flow to the kidney and liver.

The reduction in drug clearance by the kidney occur because glomerular filtration no longer occurs at the same rate during heart failure. This flow dependent elimination prolongs the half life of procainamide for example.

Hypoxia impairing drug oxidation or hepatocellular damage from hepatic congestion or hypoperfusion may be responsible for the reduced metabolic capacity of the liver in heart failure.

Kidney Disease

Many drugs are eliminated from the body via renal mechanisms. These drugs primarily cleared by renal excretion thus show a prolonged half-life in patients with impaired function.

Drug metabolites can also accumulate and contribute to toxicity. N-acetyl procainamide, the main active metabolite of procainamide, accumulates in the plasma of patients in renal failure and causes cardiac rhythm abnormalities. (2).

Toxicity of the aminoglycosides and digoxin have been well documented in patients with renal disease. Steps aimed at avoiding toxicity are illustrated in Table 2.

Changes also occur in drug binding to protein in kidney disease. It has been suggested that altered protein synthesis and structure of the albumin of uraemic patients may be responsible for these differences. (5)

The unbound fraction of diphenylhydantoin is markedly increased in uraemia. An important point to remember is that epileptics with uraemia respond both therapeutically and in terms of adverse effects at much lower total plasma concentrations of phenytoin than epileptics without kidney disease.

Other drugs showing reduced binding to albumin in renal failure and hence increased toxicity include warfarin, phenylbutazone, sulphonamides and salicylates.

Table 2: Drug administration in renal failure

1. Maintenance dose of the drug should be smaller and/or
2. The dose of the drug should be given less frequently
3. Review the fate and metabolism of drugs administered.
4. Examine patient often, noting adverse drug effects.

Normograms have been drawn up as aids to appropriate drug schedules in renal failure. They may be helpful and should be used and appropriate revisions made for each individual patient.

Gastrointestinal Disease

Diseases altering the rate of gastric emptying affect drug absorption. Table 3. Delayed gastric emptying may produce therapeutic failure with aspirin in patients with migraine. More rapid pain relief is obtained by giving aspirin with metoclopramide. Metoclopramide increases the gastric emptying rate. This ensures that the analgesic is brought to absorption sites on a more rapid basis.

Table 3: Disease altering rate of gastric emptying

Increased	*Decreased*
Coeliac disease	Migraine
Duodenal ulcer	Myxoedema
	Gastric ulcer
	Intestinal obstruction
	Severe Pain — Myocardial Infarction.

In coeliac disease, there is destruction of Villi and Microvilli. This may lead to a reduction in the surface area available for drug absorption. Amoxycillin and Pivampicillin show decreased rates of absorption in this disease. Some drugs on the other hand show an increased rate of

absorption and include sulphamethoxazole, trimethoprim, clindamycin and fusidic acid.

Malabsorption states are commonly encountered in tropical clinical practice and the research efforts of the Clinical Pharmacologist and Clinical Pharmacists should also be directed at drug responses in patients suffering from these conditions.

Iron deficiency anaemia is a common disease entity amongst our patients. Changes in the stomach and intestines may be profound enough to alter drug absorption and individual responses. This subject is being investigated presently at the Centre. (6).

Conclusion

While acknowledging that the effects of disease on drug disposition may sometimes be more academic than practical, it does not in any way lessen the importance of the subject under discussion.

Most preliminary drug studies are carried out on normal, healthy volunteers. The pharmacological patterns obtained in such studies may however differ markedly in those individuals suffering from disease.

It should be the duty of the Clinical Pharmacologist and Clinical Pharmacists to ensure that data is accumulated and analysed relating to the effects of disease on the pharmacokinetics of drugs. No where is this more urgently needed than in the tropical milieu. We are presently importing drugs developed elsewhere without note being taken of the different pharmacogenetic, pharmacokinetic and environmental factors which may be operating in this and other tropical countries.

The current scope of the research efforts of the Centre for Tropical Clinical Pharmacology and Therapeutics covers studies on the topic under discussion. The results emerging can only improve patient care.

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Current Concept in Diarrhoea Management with Special Emphasis on Infantile Diarrhoea

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THE writer was a participant at a 2-day Conference organised in Accra on 21st - 23rd April, 1988 jointly by the Ministry of Health, DANAFCO, USAID and UNICEF on the occasion of the Launching of locally-produced ORS in Ghana.

The invaluable practical experiences, research findings and observations made by the invited speakers, together with information gathered from "Dialogue on Diarrhoea" (an International Newsletter on the control of diarrhoeal diseases) and an editorial perspective expressing the views of UNICEF and WHO on the topic, which were circulated during the conference, have been compiled by her for the education not only of fellow pharmacists, but to all categories of health workers and the whole community at large.

Diarrhoeal diseases, among malnutrition and upper respiratory infections, are the three major causes of infantile mortality especially in developing countries, and all three can be found in a child at the same time.

Over the years, there have been conflicting teachings on diarrhoea management in children not only between different nations or cities, but even between different hospitals in a given community as was examplified by a lecture on "ORT - An International Perspective" given by Dr Roy Brown, who is the chairman of Community Medicine Department, at St. Joseph's Hospital, New Jersey, U.S.A.

The ancient concept and management of infantile diarrhoea have been outlined below:

1. Stop diarrhoea as fast as possible:
   - This was achieved by the use of:
   i. Bulk absorbents such as Kaolin and Bismuth.
   ii. Drugs that reduce intestinal motility eg. Codeine and Atropine - containing drugs like Lomotil.
   iii. Antibiotics such as Sulphonamides, Penicillins and Neomycin, since all diarrhoea was thought to be caused by bacteria and other parasitic agents.
2. Withhold food including Breast milk during the diarrhoeal episode. This is because a sore in the stomach or spoilt food was held responsible for most cases of diarrhoea, and the digestive system was thus thought unfit to deal with an additional burden of food. Some hospitals even advised patients to restrict fluid intake during the period.
3. The idea or concept of the loss of body fluids and electrolytes through the diarrhoeal stools which could lead to dehydration of the infant, and the need to replace these i.e. rehydration, was not at all considered in the management of infantile diarrhoea until it was rather too late.

There was also the tendency to administer parenteral anti-emetics such as injection Largactil where diarrhoea was accompanied by vomitting.

The responsibility for these anomalies must be shared by all not only mothers, but all categories of health workers, both in the developed and developing countries.

The result was that a greater proportion of cases of infantile diarrhoea ended fatally due to severe dehydration and malnutrition and the few lucky ones that were saved at the hospitals had to be rehydrated by intravenous fluids such as 1/2 strength Darrow's Solution.

New Concept

Learning from these mistakes, a new concept of infantile diarrhoea with the requisite management has now been developed and is being propagated by UNICEF, WHO and other international bodies. Governments throughout the world would do well to adopt these new measures and make them national policies in order to save their peoples. The current concepts are enumerated below:

1. About 95% of cases of infantile diarrhoea are of viral origin for which antibiotics are not necessary.
2. If in doubt, stool examinations should be carried out and when organisms such as shigella, E Coli or amoebae are found, the right medication in the correct dosage regiment should be used.
3. Dehydration of the infant is the major cause of death in infantile diarrhoea especially with concomitant vomitting.
4. The loss of body fluids is accom-

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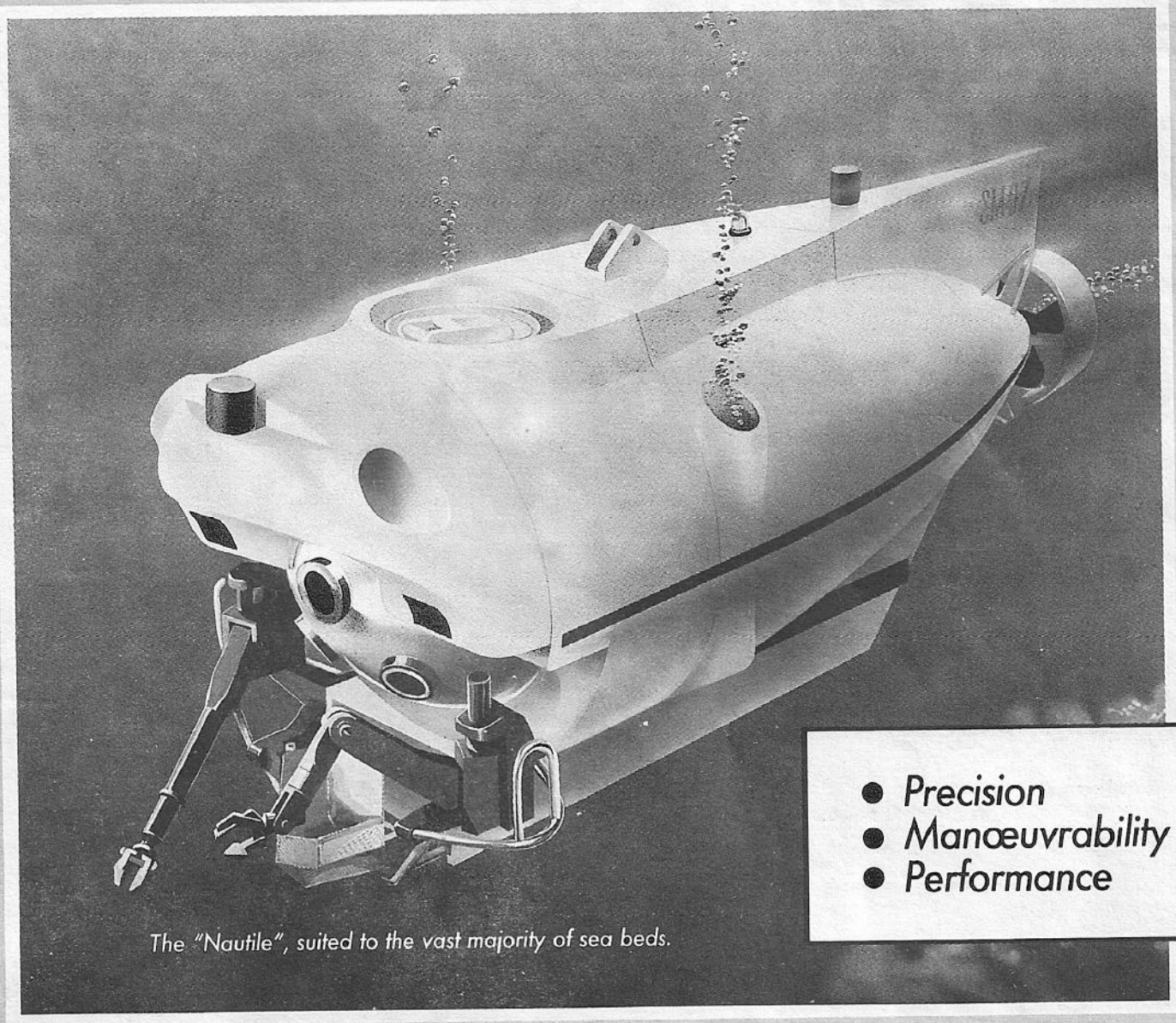

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panied by essential nutrients which must necessarily be replaced for intestinal tissue repair and general body growth and therefore, there is the need to maintain a much more dietetically - balanced feeding both during and after each episode of diarrhoea.

It must be remembered here that studies have shown that the regeneration of the affected bowel is much more enhanced by continued oral therapy and feeding than when rehydration is achieved by the intravenous route.

5. The use of parenteral anti-emetics in infantile diarrhoea accompanied by vomitting should be discouraged completely since they tend to make the children too drowsy to drink or eat.

Based on these concepts of infantile diarrhoea, the current teaching is that the appropriate first response of parents at the onset of an acute attack of diarrhoea in a child is to provide an adequate "home prepared solution" or ORS for the purpose of preventing the occurrence of dehydration.

Before going on, it is important to enumerate the clinical signs of dehydration (*table* 1) for the education of both parents and health workers. Dehydration can be mild, moderate or severe.

TABLE I

CLINICAL SIGNS OF DEHYDRATION

PARAMETER	MILD DEHYDRATION	SEVERE DEHYDRATION
1. General Appearance of patient	Alert	Not interested in surroundings
2. Skin	Elastic	Elasticity is lost
3. Eyes	only slightly sunken	Deeply sunken
4. Anterior Fontanelle	Slightly sunken	Deeply sunken
5. Pulse	Normal & strong i.e. about 120/ min	Fast & Weak i.e. faster than 160/ min
6. Urine	Regular, may be of normal concentration	Scanty & very concentrated

Quite contrary to assertions in certain quarters that UNICEF and WHO are promoting either "home prepared solutions" or pre-packaged ORS in their campaign in diarrhoea management, an editorial perspective currently issued by the two bodies state categorically that "Both home prepared solutions and pre-packaged ORS have their appropriate place in a comprehensive diarrhoeal disease programme and UNICEF and WHO are successfully advocating this comprehensive approach in many countries around the world."

It is important, however, to identify the different types of rehydration solutions available and the advantages and limitations of each in order to make the best selection in any given situation. These are presented in *tables* 2 *and* 3 below for clarity.

TABLE 2

REHYDRATION SOLUTION

Home prepared Solutions	UNICEF/WHO-prepackaged ORS
1. House hold Solutions e.g. rice water, watery akasa, root vegetable solution e.g. carrots necessary to add salt	
2. Sugar-salt solutions 8-level teaspoons sugar, 1 - level teaspoon cooking salt in a litre of water	

TABLE III

COMPARISON OF REHYDRATION SOLUTIONS

Type of rehydration solution	Suitability to infants up to six (6) months	Availability of ingredients	Availability of portable water	Special measuring devices	Keeping time of solution	Cooking	Consistency of solution concentration	Effectiveness in correcting Acidosis & Hypokalaemia
1. Household food solutions e.g. Rice Water	Not suitable for up to 6 months babies because of incomplete digestion of starch	Whatever starch food locally available is used	Not much of a problem since food will be cooked	No special measuring devices needed	Fermentation and bacteria growth may limit useful life of solution to only a few hours especially rice solution	Necessary so may pose a problem in certain areas	No specific concentration needed	Not effective
2. Sugar-salt solutions	suitable for all ages	sugar and/ or salt may not be available	may be a problem	may pose a problem	24 hours	Not necessary	The major limit to its use, Conc. of solution too variable, even in a small sample area	- do -
3. Pre-packaged ORS	- do -	may or may not be available especially in remote villages	may be a problem	- do -	- do -	- do -	standard for optimum absorption of both glucose and salt	because of added $-HCO_3$ & K^+ is the most effective

It should be re-emphasised here that it is much simpler and easier to prevent than to correct dehydration in infants with diarrhoea, and the affected child should be attended to with utmost care and patience.

The rehydration solution and the infants' food should be given by cup and spoon. They should be given not in cupfuls at a time which may prolong an already existing vomitting or generate same in one not already vomitting, but should be given in spoonfuls steadily and persistently. Rehydration by the intravenous route should be resorted to only when the child is too weak to hold his head up or unconscious.

In summary it should be stated that any meaningful national campaign on the control of infantile diarrhoeal diseases, should aim at prevention rather than treatment. Any such programme should be tackled intersectorally with mass health education and complete community involvement.

Aspects of prevention such as good sanitation and environmental hygiene stressing on food hygiene, good drinking water and proper disposal of wast ematerials; good nutrition embracing breastfeeding; personal hygiene of all in the community and the immunisation against childhood communicable diseases such as measles, must form the basis of a world-wide comprehensive campaign against diarrhoeal diseases in infants.

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Clinical Pharmacy Practice—Drug Information

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History

THE massive increase in volume of pharmaceuticals and related medical literature led to the establishment of the 1st Drug Information Centre in 1962 at the University of Kentucky (Barkholder, 1983). This served as a prototype for later organisations.

Pharmacists in hospitals providing information on drug related problems have confined themselves with only the pharmaceutical aspects of drugs like dosage and formulation or to physical and chemical properties of drugs.

Specialization in drug information resulted from the concept of the pharmacist's involvement with patient related aspect of therapy as well as product information in UK. To support this role, drug information centres were established in London and Leeds in 1970. Presently many hospitals with clinical Pharmacy service have drug information as a support service to the pharmacist visiting wards. It can be said that drug information has evolved out of clinical pharmacy.

Scope of Service

Although hospital based drug information services are normally available to all health care professions including doctors, technicians, pharmacists, nurses, biochemists and microbiologists, whether in the hospital or in the community it is the clinician who tends to be the largest beneficiary either directly or indirectly.

Functions

The main function of a drug information centre is to provide a bank of information on drugs for the clinician and the Clinical Pharmacist. Infact it acts as a support service to the pharmacist visiting wards. The drug information centre monitors adverse drug reaction and report to the Committee on Safety of Medicines.

It participates in the Pharmacy and Therapeutics Committee which provides objective reports to serve as the basis for discussion and implementation of decision. Advantageous to the pharmacist because it provides a way for him to influence choice and conduct of drug therapy since such committees seek to rationalize hospital medication by selecting certain products within the group. (Production of Hospital formulary).

It serves as a valuable information bureau for literature search to solve patient related problems.

Drug information service extends its scope to the teaching of both under graduates and as part of continuing education of pharmacist and possibly other members of the health care team.

Role of the Pharmacist

The Drug Information Pharmacist finds himself at the interface of a vast amount of knowledge residing in the literature on the one side and the person needing information for safe and effective treatment of patients on the other side.

He collects and assesses information on one hand and communicates the relevant information to the appropriate user.

To fulfil this role the pharmacist must develop and maintain a comprehensive data base by abstracting and indexing available information services and be familiar with, and be able to retrieve information from commercially available services in order to answer queries or enquiries.

He collates and evaluates material for dissemination to the health care professionals. He therefore has to know their area of expertise and interest.

The pharmacist as a drug information specialist is able to consult with the clinician on all aspects of medications and drug therapy giving accurate evaluated advice as free from bias as possible.

Sources of Information

A Drug Information Centre (DIC) with a good collection of source material will be able to deal with various questions as they arise. This material must be continually updated and maintained.

There are three broad categories of information sources. They are Primary, Secondary and Tertiary. A valuable type of reference source, however may have all three levels of information centre, e.g. compendia or handbooks. These will seldom be read from cover to cover but rather will be frequently ready references to be consulted. Therefore they must be kept close at hand. They answer questions usually of factual nature and not of detailed discussion e.g. Identification, market availability, cost, dosage, Interactions etc.

Primary Sources

As the name implies, is "straight from the horses own mouth". It is usually the first time the material appears in any shape or form. Clinical observations and scientific experiments are recorded. Original information may be transmitted verbally or in prints. Conferences, particularly discussion after each

speaker can be another source of primary information. From these emanate pre-prints and published proceedings.

Primary sources are subdivided into the following:

1. RESEARCHERS' AND MANUFACTURES MATERIAL:

a) **Patents:** Usually lodged when drug is discovered.
Takes 6-7 years before actually marketed.

b) **Submissions to Medicine Commission:** Submitted by manufacturer to obtain product licence. The information comes in volumes after a number of years research. Such information is highly confidential.

c) **Data Sheets:** - Much more mandatory material than used to be but still lacks few information, e.g. side effects, contra-indications, Preservatives, etc.

d) **Technical Sheets or booklets:-** Also deficient and biased in favour of product. This is usually well referenced but many of the references are irrelevant. These are mostly seen by *physicians*.

2. SCIENTIFIC JOURNALS:

—Some of these journals exclusively report experiments whilst others report on new development. Most medical journals used contain all three forms of information. Depending on content, the Journal can be directed mainly at.

—**Researchers**: e.g. the Journal of Pharmacy and Pharmacology. Practitioners e.g. the Pharmaceutical Journal and the American Journal of Hospital Pharmacy.

—Some Scientific Journals also emanate from 'learned bodies' e.g. British Medical. Journal Reputable journals usually have a review process for the main articles published therein. Any journal which does not undergo this review process should be treated warily e.g. Journal of Clinical Pharmacology. 'Core' journals are the ones that are most highly thought of and most frequently cited e.g. British Medical Journal, and the British Journal of Clinical Pharmacology. These are useful in Drug Information Centres.

3. THESIS:

—Not generally used. Materials from them are usually published in bits.

Secondary Sources

Secondary Sources of Information point to, and in some cases digest, information published elsewhere in a primary source. They are usually indexing and abstracting services.

Indexing:- list the original article by one or more key words describing an aspect of the information in the article.

Abstracting service provide a summary of the content. These can be at 3 levels.

Telegraphic: Gives further set of key words which describe the contents

Indicative:- Gives more information than before but structured in sentences.

Informative:- Longest and should give most information about the total content of the article to allow one to decide whether or not to get hold of the original.

One should *never* pass on information from abstracts without trying to obtain the original article. It should only be used as a way into the original article.

Secondary Sources useful in Drug Information.:

International Pharmaceutical Abstracts (IPA):
Besides covering pharmacy journals extensively, it includes many clinical journals. Its organisation and vocabulary are easy for the pharmacist to use. It is arranged in sections, about 25, in each issue which bring together abstracts or related topics. IPA is published twice a month with a subject index in each issue.

Disadvantage:- Time lag and material may be anything up to 2 years old. This is the only one which is completely pharmacy orientated and valuable for retrospective searching.

Inpharma:- This does not suffer from time lag. Distributed weekly by air mail and abstracts appear within 2-3 weeks of original article. This is clinically orientated. It looks at core journals in depth and scans the titles of many others. It is geared up to current awareness of what abstractors consider to be reports of major importance and interest for all involved with drugs and drug therapy.

Index Medicus: This contains no abstracts, just author, title and citations or journal details. The vocabulary used is highly controlled and only words listed in Medical subject headings are used as access terms. These are usually called *Mesh* terms e.g. cardiac arrest — HEART ARREST. A drug usually appears under its generic name. It is important to consult Mesh because cross references do not appear in monthly issues. References here are arranged firstly in English in an alphabetical order of journals and in foreign languages also in alphabetical order. It is produced by computer and only small part is retrieved by "Medical Literature Analysis and Retrieval System." This is a computerized data bank from which Index Medicus is produced.

Excepta Medica:- Provides abstracts of medical papers (English Language) from many journals than are covered by "Medlars" but is more selective in its articles. It is broken down into sections which are separate publications e.g., Pharmacology and Toxicology. This is a computer-based service and publishes a number of by-products of interest to pharmacists e.g., Adverse (Drug) Reaction Titles and Drug literature Index.
Clinical - Alert:- Abstracts of Adverse effects which have appeared recently in papers.

De Haen

This is a short name for several drug information systems supplied on file cards by Paul de Haen Inc. New

York. For example:

a) Drugs in Prospects—Alerts subscribers to new pharmacologically active compounds and provide access to original published data.

b) Drugs in Research:- Drugs being used on trial based in US. Generic names, other names and code numbers.

c) Drug Interactions: Provide analysis of drugs in humans and animals. Gives excerpts from reports.

d) Diagnostic trends:- Describes test procedures and diagnostic aids.

e) Drugs in Use:- provides reference to clinical drug experience. This is computer-based and will print out various extras e.g. Adverse Reaction Titles, Non proprietary names Index.

Iowa **Drug Information Service (IDIS):** Computer based Mailed to subscribers on microfiche with two indices

Drug and disease States: The vocabulary used is based on American Hospital Formulary and there is a cross reference book supplied. However the disease terms are from International Classification Diseases. No cross references are supplied and this can make life difficult.

The beauty of the system is that each article cited is supplied complete on microfilm and is thus instantly available.

Others

Formularies, pharmacopoeias and textbooks all fall into the category of "secondary sources".

Tertiary Sources

Information here does not usually answer the problem in hand but acts as pointer to where it may be found. Examples are Dictionaries and Encyclopedias which provide derivations and definition of terms used in literature. A good Medical dictionary and English dictionary are essential in a drug Information Centre. Desirable additions are dictionaries of synonyms (Index Nominum), abbreviations. Guides to medical terminology, chemical nomenclature, chemicals of medicinal importance (Merck Index) are useful. Directories and year books provide access to persons, organisations or places. The Chemist and Druggist Directory, manufacturers or suppliers catalogue and price list. Annual Register of Pharmaceutical Chemists can all be found in this category.

Other Sources

No matter how extensive the collection, it is sometimes necessary to go beyond it when answering queries. Libraries particularly medical, university and commercial may be used. Research associations, government bodies, information department in industry, Forensic laboratories etc.

Martindale's Extra Pharmacopoeia — It cannot be grouped in any of the above categories but has been found to be the most valuable single book providing information on all aspects of medication. One other book containing a selection of widely ranging information is the Pharmaceutical Handbook. The Monthly Index of Medical Specialities (MIMS), The Physician's Desk Reference can all be useful

The sources of information are many and the more available they are, the better equipped the specialist is for the job.

Storage and Retrieval

Efficient and Effective filing system is required for easy and ready access to the stored information. There is therefore the need for all documents to be indexed and classified. In retrieving information there are several stages.

Phases of Retrieval

Word Retrieval:- Words that adequately describe the information sought, can be identified eg. Dictionary.

Reference Retrieval:- reference probably pertinent to the enquiry are identified eg Index Medicus for reference material.

Document Retrieval:- Actual documents are located eg. a good library or information centre aids in document retrieval.

Data Retrieval:- The sought information is extracted from the documents.

The drug information centre must be geared up to handle the whole operation. Each document must be stored in some accessible place and be able to be located. It must be identifiable by some label or key representing the content. But documents have a whole set of characteristics that may serve as search keys. These may characterise its origin (author, institution, date, language) or its subject material (eg drugs, diseases). The first group is straight forward. The terms are self standardising eg. author usually spells his name in only one way in each document he writes.

Subject content keys are more difficult and not straight forward. Within even a short document there may be many subjects which could be characteristic so that the problem of selection arises.

The process of assigning key words is broadly speaking, what is meant by INDEXING. It can be analysed into four stages.

1. A decision is taken as to what kind of keys will be used to identify the document.
2. Appropriate keys are then assigned to the document
3. These keys are then standardised.
4. A physical record is prepared and filed.

Someone scans the document, finds out what it is all about and states the theme (Sometimes done by author and key word are supplied at the beginning of the article).

Two types of Indexing

1. Pre co-ordinate index:- just an alphabetical list of words which may have 'see' or 'see also' references. This becomes more complicated when using phrases like clinical Pharmacology or inverted phrases eg. pharmacology-clinical, pharmacology-experimental, pharmacology-animal. This type limits the method to one search at a time. This type of index is often on microfilm.

2. **Post Co-ordinate Indexing**

This allows quicker searching in that all the terms are searched at one time. One kind is "edge-notched" cards. These have holes punched round the edges of each one of which is assigned on indexing term. Another kind is feature cards but the most sophisticated of post cordinating index is the computer. Using some inputs it carries out all the

operations of filing, and storing information from the documents. It compares, matches, sorts and searches this file.

Classification

It is an extended form of indexing. By an analytical technique documents are fitted into a pre established scheme. The essence of successful classification is that any item can be placed into grouping.

In documentation a hierarchical system can be devised based on the assumption that topics can be divided into more specific subject areas. To tie up with pre-cordinate indexing the documents must be coded in some way to find the location in the filing system. Spaces must be left to fit new documents into the system or new concepts.

A drug information system may use a pharmacological classification. The coding may be either letters, numbers or mixed eg. file "J" may represent anti infective agents/infestational drugs. "JA" may be antibiotics, "JA O1" aminoglycosides, "JA O2" cephalosporins etc. Classification of this kind can be got by consulting the pharmacological index in MIMS. In post co-ordinate indexing no classification system is needed. Documents need only be given a number.

RETRIEVAL

Search strategy

The first thing one must do before searching is to obtain details of the caller, and establish the exact nature of the enquiry. To this background, information must be obtained from the caller and if the request is patient related then patient details must be obtained. All of these aspects will be dealt with later.

The second thing which must be established is what effort, if any, the caller has already made to find an answer.

Systematic Search

(1) Begin by examining available reference books. (If the topic is unfamiliar to you get some general background for yourself before trying to answer the question).

(2) If no adequate answer can be found in (1) proceed to secondary references sources. Often these appear to provide an answer. *However* this should only be taken as a pointer and if possible the primary reference should be consulted. This is because abstracters may not be familiar with the topic they are abstracting and errors can occur in terms of interpretation of the original material. Typographical errors can also occur. THESE ARE NOT USUALLY EDITED. If secondary source isused be sure you are convinced of the feasibility of the material.

(3) Find the primary reference. This sometimes causes problems because journals are not always available.

Snowball approach

Sometimes one is fortunate, when receiving a request, to know of a very good review article in the subject area. In this situation instead of a systematic search one can use this as a starting point and find the primary material cited in it.

Level of effect

In order to decide how much detail is required in an answer one must first classify request as to its nature, and the professional background of the caller. This will do three things.

(1) Act as a pointer to the amount of background information required.

(2) Give an indication of the specific reference sources that have to be consulted.

(3) Give a clue to the type of answer which is required. Some requests only require brief simple answers culled from the data sheet say, while others need lengthy complex answers.

Organization of work

(1) There are some requests to Drug Information which must be answered now. These are the situations when some action needs to be taken regarding a patient immediately. e.g. initiation of therapy with say metronidazole—What is the dose? Or adverse effects of drugs—is this hazardous, should therapy be discontinued, what is the alternative? Identification of drugs in overdosage? In some other patient situations the decision can be postponed for a day, or maybe two or three. These are the times when say the patient's response seems slow but will leave it for 24 hours or so. If it does not speed up what alternative therapy is there? In general, however, requests regarding specific patients must take precedence over all else. Other types of request may be of an 'educational nature' in terms of the caller. e.g. A physician wishes to rationalise the use of 'penicillins' by his firm. Is there a 'best buy' here. e.g. Ampicillin v Amoxycillin? Or, a representative has been promoting a new drug, do you think it has anything to offer over established therapy? These types of query while not having any immediate effect in terms of a specific patient can influence prescribing.

Requests are often received from physicians to help with a literature search in the field of some research topic they are pursuing. While it is in the interests of pharmacy to support research, and good for public relations to produce results, in terms of work load these requests would receive a lower priority than the others.

Evaluation of material

Consideration must be given to several factors in evaluating reference material.

(1) Who is the author and what are his credentials?

(2) When was the material published?
(Time lag 2-3 years for books. 1-2 years for review articles)

(3) Is it the most current edition?

(4) How current are the citations at the end of the article and what kind of references. (e.g. textbooks or primary journals.)

(5) Are the statements you considered to be important backed up in any way to allow confirmation.?

The publication of an article in a respectable journal by no means assures that its contents are accurate or that the conclusions should be accepted without question. Some questions one should ask here are: What is the objective of the article? Is the response which will demonstrate efficacy or safety clearly defined? Do you agree with the authors view? Is it clinically meaningful?

Training

Pharmacists wanting to specialize in drug information must undergo training in clinical orientation and information science. It should be necessary for the former to be included at the undergraduate level or at the post-graduate level as it is being done presently. At the post-graduate level pharmacist with a commitment to clinical pharmacy must continually expand and update their own knowledge (ie self study). It is necessary that hospital pharmacy make time for inservice training.

Training in information science is available at several levels. For example in the United Kingdom, courses are organised at certificate, diploma and degree levels in order to provide the student with the educational background to exercise skill, judgement, initiative, and responsibility in this field. After acquiring this knowledge, the student is able to practice in a variety of backgrounds. In practical situation, he must be able to select material for purchase, obtain and provide scientific data, use equipment, edit reports, make abstracts of articles and prepare other formats of information. He must also classify and index items of information, be able to carry out literature searches if required and be sure that users of the system get the information they need as well as what they want.

Training should also include *Communications* techniques both written and oral. Pharmacists in information centres also have some management responsibility and therefore must be instructed in the spheres of policies and procedures, budgeting, organizing other personnel and interviewing techniques.

It must not be forgotten that some pharmacists have gained experience and acquired these skills through supplying drug information over many years, and now act as role models for younger pharmacists who gain on the job training and experience in information handling by rotating through drug information centres.

Difficulties

Difficulties facing all drug information specialists in providing a consistently high quality efficient service are as follows:

1. There is no one source of available information which is complete in itself, and so a combination of sources, as funds allow, have to be assembled. Despite this, deficiencies will still exist in the completeness of many subject areas with perhaps a total lack of information in others.
2. The time lag before information reaches information specialists in certain parts of the world.
3. Lack of time on the part of information specialists to evaluate the quality and appropriateness of all the information collected on a particular subject.
4. Lack of acceptance of the role of the drug information service as a source of reliable, relevant information on the part of some clinicians.
5. Resistance on the part of some pharmacist to specialization in pharmacy on the basis that each pharmacist is competent in every area of practice. This notion is completely out of place and hampers evolution of the profession to standards of excellence in these emerging role.

It must be emphasized that, if a first-rate extracting service is required, then something not less than a 'super' IOWA system could be established with all information available on microfiche and disseminated much more quickly with some form of evaluation built in the system. The fact that Martindale's Extra Pharmacopeoa is becoming available as on-line computerized data will represent a significant advance in this area because this is evaluated data and will be constantly updated.

Conclusion

Despite the fact that discussions have centred largely on drug information centres in developed countries, it is hoped that interested pharmacists in the developing countries eg. Ghana with limited funds to support their claim, will find it helpful in organizing a service within the limitations of their own departments. If the pharmacist is enthusiastic about his role as an advisor on drug therapy, then pursuing the course of drug information as a speciality will provide job satisfaction, for it will fulfil his professional obligations and at the same time bring benefits to clinicians and patients.

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