Clinical Pharmacy Practice-Drug Information

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History

The massive increase in the volume of pharmaceutical 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 to only the pharmaceutical aspects of drugs like dosage and formulation or the physical and chemical properties of drugs.

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

Scope of Service

Although hospital-based drug information services are normally available to all health care professionals including doctors, technicians, pharmacists, nurses, biochemists and microbiologists, whether in the hospital or 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. In fact 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 participated in the Pharmacy and Therapeutics Committee which provides objective reports to serve as the basis for discussion and implementation of the decision. Advantageous to the pharmacist because it provides a way for him to influence the 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.

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Drug information service extends its scope to the teaching of both undergraduates and as part of continuing education of pharmacists 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 database by abstracting and indexing available information services and be familiar with and 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 the 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 the 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 MANUFACTURER MATERIAL:**
   a) **Patients**: are usually lodged when the drug is discovered. Takes 6-7 years before being marketed.

b) **Submissions to Medicine Commission:** Submitted by the manufacturer to obtain product license. The information comes in volumes after several years of 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 of Booklets:** Also deficient and biased in favour of the 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 the 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 but one or more keywords describing an aspect of the information in the article.

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

Telegraphic: Gives a further set of keywords which describe the contents

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

Informative:-Longest and should give the 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 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 brings 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 oriented 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 the original article. 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 a computer and only a small part is retrieved by the "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 some 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 s a short name for several drug information systems supplied on file cards by Paul de Haen Inc. New York. For example:
a) Drug in Prospects – Alerts subscribers to new pharmacologically active compounds and provides access to original published data.
b) Drugs in Research:- Drugs being used on trial based in the 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 procedure and diagnostics 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 mail to subscribers on microfiche with two indices.

Drug and disease Stated: The vocabulary used is based on American Hospital Formulary and there is a cross-reference book supplied. However, these disease terms are from the International Classification of 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 this 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 at hand but acts as a pointer to where it may be found. Examples are Dictionaries and Encyclopaedias which provide derivations and definitions 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), and abbreviations. Guides to medical terminology, chemical nomenclature, and chemicals of medicinal importance (Merck Index) are useful. Directories and yearbooks 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 departments in industry, forensic laboratories etc.

Martindale's Extra Pharmacopoeia- It cannot be grouped in any of the above categories but is the most valuable single book providing information on all aspects of medication. One other book containing a selection of wide-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

An 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 e.g. Dictionary.

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

Document Retrieval:- Actual documents are located e.g. a good library or information centre aids n 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 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 origins (author, institution, date, language) or it's subject material (e.g. drugs, diseases). The first group is straightforward. The terms are self-standardising e.g. author usually spells his name in only one way in each document he writes.

Subject content keys are more difficult and not straightforward. 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 keywords 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 is all about and stated the theme (sometimes done by the author and keywords 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 e.g. 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 around the edges of each one of which is assigned on the indexing term. Another kind is feature cards but the most sophisticated post coordinating 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-coordinated indexing, the documents must be coded in some way to find their 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 e.g. file "J" may represent anti-infective agents/infestational drugs. "JA" may be antibiotics, "JA 01" aminoglycosides, 2JA 02" cephalosporin 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 (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 sources are issued 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

To decide how much detail is required in an answer, one must first classify the 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 for 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 patient situations the decision can be postponed for a day, or maybe two or there. 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 requests may be 'educational' in terms of the caller. E.g. a physician wishes to rationalise the use of 'penicillin' by his firm. Is there a 'best buy' here, e.g. Ampicillin v Amoxicillin? 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 the 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 interest of pharmacy to support research, and good for public relations to produce results, in terms of workload 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 the post-graduate level as it is being done presently. T the post-graduate level pharmacists with a commitment to clinical pharmacy must continually expand and update their knowledge (i.e. self-study). Hospital pharmacies must make time for in-service 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 to provide the student with the educational background to exercise skill, judgement, initiative, and responsibility in this field. After acquiring this knowledge, the student can practice in a variety of backgrounds. In a 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 do not 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, has 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 reached 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 pharmacists 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 the evolution of the profession to standards of excellence in these emerging roles.

It must be emphasized that is 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 Pharmacopeia is becoming available as online 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 e.g. Ghana with limited funds to support their claim, will find it helpful in organising a service with the limitation of their 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.

References

1. Burkholder D.F. (1963) Am. J. Hosp. Pharm 20 507-12.