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DRUG INFORMATION SERVICES

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ABSTRACT
Drug information centre refer to facility specially set aside for, and specializing in the provision of drug information and related issues. The purpose of drug information center is to provide authentic individualized, accurate, relevant and unbiased drug information to the consumers and healthcare professionals regarding medication related inquiries to the nation for health care and drug safety aspects by answering their call regarding the all critical problems on drug information, their uses and their side effects. Apart from that the center also provides in-depth, impartial source of crucial drug information to meet the needs of the practicing physicians, pharmacists and other health care professionals to safeguard the health, financial and legal interests of the patient and to broaden the pharmacist role visible in the society and community. The service should include collecting, reviewing, evaluating, indexing and distributing information on drugs to health workers. Drug and poisons information centers are best established within major teaching hospitals. This allows access to clinical experience, libraries, research facilities and educational activities.

KEYWORDS: Drug information, Drug information centre, Drug information services, Poisons information.

INTRODUCTION
The ***drug information*** refers to the provision of unbiased, well referenced and critically evaluated up-to-date information on any aspect of drug use.

The term ***drug information service*** can be applied to any activity where information about drug use is transferred, and includes patient-related aspects of pharmaceutical care. The term ***drug information Centre*** refers to the specialized facility that provides drug information to those need it.

Poison information refers to a specialized area of drug information that provides information on the toxic effects of an extensive range of chemicals, including plant and animal toxins.[1]

OBJECTIVES
The main objective is to provide factual, unbiased drug information as a part of an effort to improve patient care.
A drug information centre can realize various others objectives according to environment in which it are placed:
1) To promote the safe, effective and economic use of medicinal products in patients by the active and passive provision of accurate drug information and advice.
2) To achieve the rational use of drug in hospitals according to a well defined policy based on the sound evaluation of drugs.
3) To improve patient care by conducting drug utilization reviews and providing useful data for patient monitoring.
4) To establish the discipline of clinical pharmacy as a specialized profession and to expand the role of a clinical pharmacist.
5) To help Pharmacy and Therapeutics committee in rational selection of formulary drugs.
6) To reduce cost of therapy per patient per day.
7) To decrease the incidence of adverse drug interactions by pointing at them in advance.[1]

FUNCTIONS
The three major areas of responsibility of DIC's include services, education and research.
The major functions of drug information centers are discussed below:

1) Promoting Rational Drug Evaluation and Therapeutics
The DIC's play a strategic role in systemic presentation of information about rational drug therapeutics.

2) Patient Specific Consultations
Drug information specialist may actively disseminate information related to patient care when he attend ward rounds or reviews a patient's chart along with physicians.

Type of Request
a) Adverse drug reaction.
b) Therapeutic use
c) identification
d) pharmaceutical incompatibility
e) drug/lab test interaction

3) Adverse Drug Reaction Reporting
The drug information pharmacists plays an important role by following up such patients and buy filling and analyzing the forms needed for detection and reporting of adverse drug reactions.

4) Drug Interaction Monitoring
The drug information services may evaluate reports on drug interactions and suggest ways to detect interactions and to determine their clinical significance.

5) Drug interferences with Diagnostic tests
Diagnostic and pathological test results are found to be modified due to concurrent drug administration.

6) Drug utilization reviews
Therapeutic drug reviews are effective in identifying inappropriate drug prescribing practices that can lead to increased morbidity and higher health-care costs.

7) Pharmacy and Therapeutics Committee Related Functions
It is the responsibility of the DIC to provide specific drug reports for evaluation by the committee. Such reports can serve as a basis for the committee's deliberations and decisions.

8) Investigation drug information
The drug information specialist can participate in clinical investigation to establish safety and efficacy of new drugs.[1]

SOURCES OF DRUG INFORMATION
There are three sources of drug information: journals (primary source), indexing and abstracting services (secondarysource), and textbooks(tertiarysource).

1) PRIMARY SOURCE
Primary literature describes unique experiences which change the world in terms of available knowledge. Primary reports include the results of research at all levels and also clinical experience in the form of individual responses to drugs and small case series.

Primary literature is usually the most current resource for information. Unlike tertiary or secondary resources, primary literature provides details of research methodology and scientific results that lead to therapeutic conclusions.

The primary literature is growing at an exponential rate; over 20,000 biomedical journals are published annually.[2]

Some sources
- ***Clinical pharmacokinetics*:** A journal that provides review articles in the area of clinical pharmacokinetics.
- ***The community pharmacist*:** A journal published to meet the professional and educational needs of today's practitioner, published monthly.
- ***Hospital pharmacy*:** A journal devoted to the practice of pharmacy in the institutional settings, published monthly.

Benefits
a) keep abreast of professional news b) learn how a second clinical handles a particular problem c) keep up with new developments in pathology, diagnostic agents and therapeutic regimens d) Obtain continuing education credits.

Limitations: Although publication of an article in a well-known, respected journal enhances the credibility of information contained in an article, this does not guarantee that the article is accurate.

2) SECONDARY SOURCES
Secondary sources consist of reviews of primary reports. journals often publish a mixture of primary and secondary reports but there are also journals which are devoted to reviews of previously published materials.[2]

These include Drugdex (Micromedex, USA) and International Pharmaceutical Abstracts. These systems electronic, include summaries of the primary reports and are updated regularly.

Secondary literature consists of indexing and abstracting services of the primary literature. An indexing system provides only bibliographic information that is indexed by topic, whereas an abstracting service also provides a brief description of information contained in a specific citation.

Some sources
- ***Anti-infective today*-** an indexing and abstracting service that summarizes current literature on drug therapy and management of infections.
- ***Cancer today*:** An indexing and abstracting service that summarizes current literature on the use of drugs in the management of cancer.
- ***MEDLINE:*** one of the most expansive databases of biomedical information containing approx. 370,000 references.

Benefits: indexing and abstracting services are valuable tools for quick and selective screening of the primary

literature for specific information, data and articles; in some cases the sources provide sufficient information to serve as references for answering drug information improves.

Limitations: each indexing and abstracting services reviews a finite number of journals. Therefore, relying on only one service can greatly hinder the thoroughness of literature search.

3) TERTIARY SOURCES

Tertiary resources are summaries of the primary and secondary published literature, printed textbooks are the main example and these are characterized by a slow rate of revision compared to secondary resources.[3]

Tertiary literature is sometimes referred to as general literature and full-text computer data bases (e.g., MICROMEDEX, CCIS). Tertiary references can be divided into five basic types:

- Product oriented
- Drug oriented
- Disease oriented
- Specific topic and
- Specialty

TYPES OF TERTIARY LITERATURE

- Textbooks
- Compendia
- Full text computer databases
- Review articles

a) Product-oriented references: this type of references is generally the best information source for availability and identification questions. Some examples are described below.

- *Handbook of Nonprescription drugs* (American pharmaceutical Assn. Published about every 2 yrs) contain monographs on various classes of nonprescription drugs.

b) Drug oriented references: Types of questions which can generally be answered with these references are listed in their description. Some examples are given below.

- *Martindale,* contains extensive referenced monographs on drugs and drug classes with international coverage.

c) Disease-oriented references

They are very useful for questions in therapeutics and pharmacology category when asked from the disease perspective. Some examples are given below:

- *Current medical diagnosis and treatment*
- *Current therapy*

d) Specific topic references: Compatibility of intravenous drugs, drug interactions and poisoning are topics which require entire books to answer. Some examples are listed below:

- *Handbook of Inject able Drugs*
- *Drug interactions*
- *Evaluation of drug interactions*

Benefits: general reference textbooks can provide easy and convenient access to a broad spectrum of related topics. Background information on drugs and diseases is often available however while a textbook may answer many drug related questions.

The limitations of these sources should not be overlooked

DESIGN OF LITERATURE SEARCHES

- A literature search is a methodological search for all of the literature published on a topic.
- An effective search of the literature can be done quickly, but demands an organized and systematic approach, so it is important to keep records of the searches made and the information found.

DEVELOPING A SEARCH STRATEGY

To prepare for your search:

- Define your topic write down search question
- Identify what type of literature you are looking for e.g.: primary research in journal articles research reports.
- Identify sources to search database Google scholar, individuals organization.
- Develop keywords / search terms that are logical and relevant to your search.
- Think about scope of topic.
- Design a means of recording what you find (maintain records)

The following methods may be useful in breaking down your topic and developing your search strategy:

- The PICO method is promoted by organizations such as the centre for evidence based medicine is oxford and is an evidence based model for formulation a clinical question.
- The ECLIPSE method may be useful for health management and policy searches.

Literature searchers

These may include databases, peer reviewed journals, these and dissertations.

Internet: Google scholar, Govt websites, discussion papers enquiry results, govt polices, organization and professional websites, newspapers, statistics, library catalogues.

Depending on your research topic, the following are likely to be useful resources:-

1) Medline/ Pub med: Generic health and medical databases.

2) Health business Elite: Covers health care administration and other non-clinical aspects of health care management.
3) The Cochrane library: Collection of databases that contain high quality, independent evidence to inform health care decision making.
4) Soc index: Sociology research databases.
5) CINAHL: nursing and allied health database.
6) Econlist: index of the world's economic literature, produced by the American economic association.
7) Google scholar: multidisciplinary.
8) SINGLE (system for information on grey literature in Europe): multidisciplinary.
9) Lenus: an Irish repository for health care information.
10) Rian: multidisciplinary portal for open access Irish research publications.

IMPLEMENTING YOUR SEARCH

- You can begin your search using all different combinations of keywords that you have, using AND\OR\NOT as appropriate.
- It is important to do this systemically and keep a record of all the searchers you do.
- You are likely to fine that you develop new ideas for the search terms during the searching process.
- If you don't have any hints from your search then you need to keep searching with different keywords until you indentify literature that is linked to your topic.
- Once you have identified the key literature on your topic using one database. You should repeat the search using another database.
- If you find that the same reference are thrown up, you can be confident that your strategy is well focused and you area accessing the relevant literature on your topic.

SEARCHING THEE REFERENCE LISTS: - Once you have identified the key articles that relate to your research questions, it can be useful to look at the reference list of these articles further references that may be useful.

HAND SEARCHING RELEVANT JOURNALS: - if you find that many of your key articles are located in one or two journals. It may be useful to hand search these journals.

AUTHOR SEARCHING
If you find that many of your key articles are by the same author, it may be useful to carry out an author search to see whether the author have published other relevant materials not identified in the electronic search.

EVALUATION OF DRUG INFORMATION AND LITERATURE
BASICS
Literature evaluation skills are essential in many areas of pharmacy practice. Pharmacists are faced with an increasingly literate patient population who educate themselves about drug therapy by consulting various individuals, searching the internet, and reading both the medical literature and lay press. Such patients often seek the advice of a pharmacist to interpret information. They have obtained likewise, physicians and other health care professionals often contact pharmacists for opinions regarding various aspects of therapy.

EVALUATING CONTROLLED CLINICAL TRIALS (true experiments)
In a clinical trial or true experiments, researchers administer a drug or treatment and follow the subjects forward in time to determine the effects of such treatment. Randomized controlled clinical trials, a type of true experiment, are the gold standard for determining cause and effect relationships.

A) Journal, investigators, research site and funding: The first step in the literature evaluation process begins by briefly scanning the article. The study should be published in a reputable journal where manuscripts undergo peer review before publications. Clinical studies are rarely if ever published in "throw-away" journals.

B) Title/Abstract The title of the article should be brief and catch the attention of readers interested in the topic. The title should also be unbiased and should not indicate author's preferences for any particular drug treatment.

C) Introduction The introduction part of a clinical study contains background information for the study sufficient background information should be provided to demonstrate that the study is important and ethical.

D) Methods Study methodology is the most important section of a clinical study.

-Parallel versus cross-over studies Important points to be considered in cross-over studies:

- Wash out period must be sufficient duration to prevent carry-over effects.
- Multiple cross-over periods are useful when studying diseases.
- Subjects should be randomized to treatment order.
- Both investigations and subjects should be blinded to time when cross-over occurs.
- Subject drop-outs and deaths should be minimized.

-Sample size a sample is a subgroup from the entire population of patients with a particular disease state who would be eligible to enter the study. Sample size is very important while evaluating clinical studies. Sample size varies from study to study**.** Determinants of sample size:

- Alpha or level of significance(i.e., probability of false-positive result)
- Beta (i.e., probability of false-negative result)
- Delta (i.e., amount of difference to be detected)
- Standard deviation (i.e., variation)

-Controls Two types of controls are utilized:

- Placebo
- Active

-Outcome Variables

The investigator should define variables to be measured and amount of difference between treatment and control groups that the study is designed to detect variables should be measured at appropriate intervals to ensure that both positive and negative aspects of therapy are adequately assessed.

Both the treatment and placebo groups should be followed with same intensity.

-Binding

It helps to prevent bias from influencing study result and ensure that monitoring and ancillary care is applied equally to both treatment and control groups. Mechanism for binding the study and similarities between the treatment and control should be described in the clinical trials reports.

-Randomization: It is an important aspect of study design. It helps diminish patient and investigator bias by prohibiting investigators from assigning drug treatments. Proper methods of randomization include use of random number tables, computer-generated random numbers or lotteries. Randomization can be simple or balanced.

E) Results

-Data Data should be presented in a clear and understandable format. Authors should indicate in the article how original data can be obtained, if desired. Efficacy results should be described in sufficient detail for readers to perform their own analysis of the data. Data should be presented as actual numbers, rather than percentage changes alone.

-STUDY VALIDITY

Studies should be analyzed in terms of two types of validity-internal and external. **Internal validity** refers to the extent to which the study results reflect what actually happened in the study**. External validity** is the degree to which the study results can be applied to patients routinely encountered in clinical practice.

-Type 1 and Type 2 Errors

TYPE I error occurs when the investigators accept the research hypothesis when it is incorrect. The probability of Type I error is equal to alpha and key convention is usually set at 0.05.

TYPE II error can occurs whenever investigators conclude that 2 treatments are equally efficacious or safe. They are usually the result of chance or inadequate sample size.

F) Conclusions The conclusion section allows authors to provide an interpretation of their data and how it relates to clinical practice. Study conclusions should be consistent with results and related to the initial study questions. Results should be compared to a systematic review of all previously published data.

FORMULATING RESPONSE

Drug information services may use the systematic approach, or an adaptation of it, as the basis for responding to drug information inquires.

Factors to be considered when formulating a response.

Patient specific factors

- Demographic (eg., name, age, height, weight, gender, race/ethnic group, setting)
- Primary diagnosis and medical problem list
- Allergies/ intolerance
- History of present illness
- Family history
- Social history (eg. smoking, substance abuse, alcohol intake etc,)
- Physical examination
- Laboratory tests
- Diagnosis studies / responses

Disease specific factors

- Definition
- Epidemiology
- Diagnosis
- Prevention and control
- Treatment (medical, surgical, radiation, biological, gene therapies and others)
- Risk factors

Medication specific factors

- Name of the medication
- Status and availability
- Adverse effects
- Allergy /cross reactivity
- Contraindications and precautions

Formulating response-step wise approach

Step I: Securing demographics of requestor

The first step in the step wise approach is to accept the initial question and secure requestor demographics, determining what a drug information requestor actually wants to know is the first step in answering a question and obtaining the necessary background information. When a question involves a patient, it is important to obtain background information about the patient before responding to the query, the extent of the background information necessary to answer a question varies with the type of question. The patient's age, weight and sex are usually needed.

Step II: Obtaining background information

The following background information need to be collected.

- Requestor name

- Requestors location and or mobile number
- Requestors affiliation
- Requestor frame of reference
- Resources that the requestor already consulted
- Whether the request in patient specific or academic
- Patients diagnosis, other medication, and medical information
- Urgency of the request

Step`III: Categorization of the question
The determination of the ultimate question is important for effective use of the modified systematic approach. If background information is obtained in an open, productive exchange, the ultimate question is easily unveiled; the ultimate question may essentially be the same as the original question, particularly if the question is truly not patient specific.

Step IV: Search strategy
The categorization of the ultimate question prompts the resource selection process. For example, the Categorization of a question as 'adverse effects' suggests the use of adverse effect oriented resourced. Once resources have been selected, they are prioritized, resources may be utilized based on ease of access or degree of comport, instead of probable efficiency once the background information has been obtained, the question can be classified in one of the categories discussed earlier (adverse reactions, availability, drug interactions, etc). If primary and secondary sources are not available in the pharmacy library, or if no answer can be found utilizing them, a drug information center or pharmaceutical manufacturer should be called for assistance.

Step V: Data evaluation, Analysis and Synthesis
The information retrieved must be objectively critiqued at this stage.

Step VI: Formulation and provision of response
Answers to drug information questions should be communicated in a timely and professional manner. Consideration should be given to the time requirements of the individual requesting information ex., if a nurse makes a "stat" request for information on the proper administration of a drug. The majority of questions will be answered verbally. Pharmacist should present their findings, with confidence and in a professional manner; responses should be well brief, concise, and accurate.

Step VII: Follow up
Whenever possible, follow-up should be provided on certain types of questions. Especially questions that are directly related to patient care. For ex., a patient has adverse reactions to a particular drug, and the physician asks for an alternative therapy. After a systematic literature search, the pharmacist can make his recommendation. He should utilize this opportunity to go to the floor, see how the patient is responding to his recommendation, and offer additional consultation. Consistent follow up of this type increases interaction with other health professionals, which may promote increased pharmacist participation in direct care, including clinical rounds.

DRUG INFORMATION PRESENTATION
WRITTEN REPORTS
Drug information can be provided using various vehicles like pharmacy newsletter's & verbal presentation, formal lectures etc.

PHARMACY NEWS PAPER: Pharmacy newsletter's can be valuable service to health care professionals. The newsletter serves as a vehicle for providing drug information, and also helps the pharmacist become recognized as excellent sources of drug information.

SELECTING TOPICS: Selecting appropriate topics for publication in a pharmacy newsletter is probably the most important consideration.

Methods for selecting topics which will be useful are discussed below.

DRUG INFORMATION
1. The drug information questions received in the pharmacy are often a big help selecting a topic.
2. A newsletter's could provide this information is an efficient manner to a large number of people.

PHARMACY & THERAPEUTICS **COMMITTEE ACTIONS**
A newsletter is an excellent means of communicating the actions and decisions of the pharmacy and therapeutics committee to an institutions professional staff. Policy changes affecting the use of drugs such as dosage standardization, restricted drugs, method of handling control substances, etc. would be useful topics.

Drug use review program**:** A pharmacy newsletter can be an educational tool to combat use of drugs for e.g., if a drug uses review finds those surgeons are not ordering prophylactic antibiotics properly, an article in the newsletter could outline how the agents should be used.

JOURNAL ARTICLES**:** The articles in journals received by the pharmacy will give the pharmacist insight in to topics of current interest this includes review on review articles on therapeutic classes, clinical drug trial, adverse drug reaction reports and description of drug indirection.

WRITING FOR A PARTICULARLY AUDIENCE: The pharmacist may choose to right one letter for physicians & another for nurses or includes topic of interest to both in a single newsletter. Pharmacist will benefits from articles written for either group.

PUBLICATION AND DISTRIBUTION

The pharmacy newsletter must project a professional image. Proper appearance will greatly add to the newsletter and acceptance. The heading should be attractive, with the sources of newsletter clearly defined. A distribution list must be maintained and updated and it should include the hospital administrator.

ORAL /VERBAL PRESENTATION

Oral and verbal presentation either as formal and informal lectures in service presentation etc. Pharmacy involvement in verbal presentation begins when the pharmacist offers to participate. Once the health professionals in an institution see what a pharmacist has to offer, invitation become more and more frequent.

SELECTING TOPICS: Methods for selecting topics for presentation are identical to those for selecting newsletter topics. Topics that required demonstration for example proper administration or preparation of drugs are especially suited to verbal presentation.

PRESENTING TO A PARTICULAR AUDIENCE

The pharmacist should project a self confident and professional image while making a presentation. This will enhance the pharmacist's credibility and acceptance. Particularly with physicians.

TEACHING TECHNIQUE AND STRATEGIES

There are several teaching techniques and strategies like length of the presentation, objectives of the presentation, instructional aids, handouts etc. The presentation in the beginning use instructional aids like transparencies sides, charts, chalkboard etc, for the presentation.1

DATABASES USEFUL FOR EMERGENCY TREATMENT OF POISIONING

DATABASE

A database is a organized collection of data .so that it can easily managed, access, updated.

POISON CENTRE

- A poison centre is a specialized that advises on and assists with the prevention, diagnosis and management of poisoning.

1. Toxicological databases
2. Databases of product formulation and
3. Databases of poisoning enquiries to the centre

TOXICOLOGICAL DATABASES: Source for the study of the nature, effects, and detection of poisons and the treatment of poisoning.

Examples

1. SUPER TOXIC DATABASE
2. TOXINZ (internet database)
3. NATIONAL POISON DATABASE SYSTEM
4. TOXINET (Database on toxicology)
5. NCBI (National center for biotechnology information)
6. NELM (National emergency library medicines)

SUPER TOXIC DATABASE

- SUPERTOXIC database comprises data from publically available databases and scientific literature, assembling a vast amount of toxic compounds.
- It provides access to information about toxic compounds(names, structures, synonyms)
- Super toxic is a database, primarily designed for pharmacist, biochemist, and medical scientist, but also researchers working in cognate disciplines.
- It provides access to information about toxic compounds (names, synonyms, structure)
- Super toxic predicts the toxicity of compounds.[5]

TOXINZ (Internet database)

The TOXINZ database assists healthcare professionals in the diagnosis and treatment of human poisoning. TOXINZ comprises ~190,000 products and ~6,500 treatment protocols covering chemicals, pharmaceuticals, plants and creatures. Approximately 5,000 of the protocols cover pharmaceutical and chemical substances.[6]

TOXNET (TOXICOLOGY DATA NETWORK)

- TOXNET is a group of databases covering chemicals and drugs, diseases and the environment, environmental health. Occupational safety and health, poisoning, risk assessment and regulations, and toxicology.
- It is managed by the Toxicology and Environmental Health Information Program(TEHIP) in the Division of Specialized Information Services (SIS) of the National Library of Medicine (NLM).
- A mobile version of TOXNET is available.

Information in the TOXNET database covers

- Specific chemicals, mixtures, and products.
- Chemical nomenclature
- Unknown chemicals
- Special toxic effects of chemicals in humans and/or animals

TOXICOLOGY DATA

1. CCRIS (Chemical Carcinogenesis Research Information System)
2. CPBD (Carcinogenic Potency Database)
3. CTD (Comparative Toxic genomics Database)
4. GENE-TOX (Genetic Toxicology)
5. HSDB (Hazardous Substance Data Bank)
6. IRIS (Integrated Risk Information System)
7. ITER (International Toxicity Estimates for Risk)
8. LactMed (Drugs and Lactation)8

1) CCRIS (Chemical Carcinogenesis Research Information System)

- CCRIS is developed and maintained by the National Cancer Institute (NCI)

- It contains over 9,000 chemical records with carcinogenicity, mutagen city, tumor promotion and tumor inhibition test results
- Data are derived from studies cited in primary journal, current awareness tools, NCI reports, and other special sources. Test results have been reviewed by experts in carcinogenesis and mutagenesis.

2) CPDB (Carcinogenic Potency Database)

- CPDB provides standardized analyses of the results of 6540 chronic, long term animal cancer tests conducted since the 1950s and reported in the general published literature
- This database was developed at the university of California Berkeley and Lawrence Berkeley Laboratory

3) CTD (comparative Toxic genomics Database)

- The Comparative Toxic genomics Database elucidates molecular mechanisms by which environmental chemicals affect human disease.
- CTD is developed at North Carolina State University. The development team is located at NCSU and the Mount Desert Island Biological Laboratory

4) GENE-TOX (Genetic Toxicology

- GENE-TOX was created by the U.S. Environmental Protection Agency and has genetic toxicology test results on over 3,200 chemicals.

5) HSDB (Hazardous Substances Data Bank)

- HSDB provides toxicity data for over 5,000 potentially hazardous chemicals.
- It also has information on emergency handling procedures, industrial hygiene, environmental fate, human exposure, detection methods, and regulatory requirements.

6) Household Products Database

- The household products database has information on the potential health effects of chemicals contained in common products used inside and around the home.
- Products can be searched by brand name, product type, manufacture, chemical name and by health effects.
- The record for each products shows the ingredients as reported in the manufacturer's Material Safety Data Sheet and includes more information such as handling, disposal and health effects.

7) IRIS (Integrated Risk Information System)

- IRIS is developed by the U.S. Environmental Protection Agency. It contains carcinogenic and non-carcinogenic health risk information on over 500 chemicals.
- IRIS risk assessment data has been reviewed by EPA scientists and represents EPA consensus.

8) ITER (International Toxicity Estimates for Risk)

- ITER data focuses on hazard identification and dose-responses assessment for human health.
- The database provides a table of comparisons of international risk assessment information and explains differences in risk values derived by different organizations.
- It is complicated by Toxicology Excellence for Risk Assessment and contains over 650 chemical records.

9) LactMed (Drugs and Lactations)

- Database of drugs and other chemicals to which breastfeeding mothers may be exposed. It includes information on the levels of such substances in breast milk and infant blood, and the possible adverse effects in the nursing infant.
- All data are derived from the scientific literature and fully referenced.[8]

NATIONAL POISON DATABASES SYSTEM

- The American Association of Poison Control Centers (AAPCC) and Centers for Disease Control and Prevention (CDC) have combined efforts to help local poison control centers detect chemical exposure events and ensure effective responses.
- The focus of these efforts is to use the National Poisoning Data System databases to improve public health surveillance of chemical exposure and other potential health hazards.
- The American Association of Poison Control Centers (AAPCC) owns and manages the National Poison Data System(NPDS), a database collating years of information and poisoning exposure calls placed to AAPCC member poison centers across the country
- NPDS is the only near real time comprehensive poisoning surveillance database in the United States.
- The NPDS database is a flexible and adaptable system.[9]

NCBI (National center for biotechnology information)

- The National center for Biotechnology Information is a part of United State National Library of Medicine. The NCBI is located in Bethesda, Maryland and was founded in 1988
- The NCBI houses a series of databases relevant to biotechnology and biomedicine and important resource for bioinformatics tools and services.
- It strongly encourages the submission of genomic data ranging from mapping information to complete chromosomal sequences with annotation.
- NCBI is working in close collaboration with many sequencing centers to provide new and updated information about ongoing genome sequencing programs for organisms ranging from microbes to multi-cellular plants and animals.[10]

NELM (National Emergency Library Medicines)

- The National library of Medicine(NLM), on the campus of the National Institutes of Health in Bethesda, Maryland, has been a center of information innovation since its founding in 1836
- The world's largest biomedical library, NLM maintains and makes available a vast print collection and produces electronic information resources on a wide range of topics that are seacrched billions of times each year by millions of people around the globe.
- It also supports and conducts research, development, and training in biomedical informatics and health information technology.[12]

CONCLUSION

All Pharmacists must be effective medication information providers regardless of their practice. With the advances in information technology, virtually every pharmacist regardless of practice setting has easy access to drug information from texts, journals, newsletters and other printed media. The pharmacist must achieve a minimum level of skill providing drug information services. This will enhance the ability of pharmacists to provide comprehensive patient care.

There is a large need for individuals with special training as medication information specialists who can operate drug information centers and provide leadership in the area of drug informatics, institution drug policy, poison control, pharmaceutical industry and academia. Pharmacy will become an information based profession as pharmacists develop a comprehensive knowledge of available resources and the skills to use these resources effectively.

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