DRUG INFORMATICS

FACULTY OF PHARMACEUTICAL SCIENCES

LECTURE 2

Objectives

1. Define the term drug information, use it in different contexts, and relate it to the term medication information.

2. Describe the importance of drug information centers in the evolution of pharmacy practice.

3. Identify the services provided by drug information centers.

4. Identify medication information functions performed by individual pharmacists.

Objectives

5. Describe the skills needed by pharmacists to perform medication information functions.

6. Identify major factors that have influenced the ability of pharmacists to provide medication information.

7. Describe practice opportunities for a medication information specialist.

A BROAD DEFINITION OF DRUG INFORMATION

- **Drug information** is both: a body of data and information about medications and a set of skills and tools that provide pharmacy professionals with the ability to find, access, understand, interpret, apply and communicate information and acquire knowledge.

- The body of facts and information pertaining to medications is generally referred to as "**the drug literature**".

A BROAD DEFINITION OF DRUG INFORMATION

- The **literature** of pharmacy and pharmaceutics **encompasses all aspects of drugs**, beginning with isolation or synthesis, including physical analysis, bioactivity, toxicology, clinical research, market research, and economic and social considerations.
- The drug literature, reflecting all the individuals who create it and use it, such as chemists, biomedical scientists, all the various health care professionals, attorneys, and patients, **is vast and complex**.

A BROAD DEFINITION OF DRUG INFORMATION

- **Different kinds of publications are available in the library like journals**, abstracting and indexing publications, books, compendia (detailed information about a particular subject), monographs, patents proceedings, reviews, FDA-approved labeling (package inserts), newsletters, promotional literature, government documents, and analysis by consulting services.

A BROAD DEFINITION OF DRUG INFORMATION

- **Drug information skills coupled with the processes and technology** offered by informatics are part of the solution to mastering information overload and maintaining the **knowledge system that improves patient care outcomes.**

INFORMATION NEEDS

- **The growth in the role played by science in medicine as reflected in:**

1. The amount of published work.
2. The number of journals.
3. The vast range of drug products in the market.

- It has meant that **practioners of medicine and pharmacy**, in common with other scientific disciplines, have **experienced difficulty in keeping up with advances in knowledge**.

INFORMATION NEEDS

- The doctor's response, increasingly, has been to turn to the pharmacist for help.
- Most problems presented by the doctor are concerned with a particular patient, his disease-state and therapy.
- The information requested is usually required within few hours, so that treatment may be changed or started and is needed in the form of data, rather than lists of references or paper reprints.

INFORMATION NEEDS

- Production of an answer therefore involves selection, interpretation and evaluation of information.

- The type of information requested may include any of the chemical or biological properties of a compound or a comparison of the suitability of several compounds for a specific case, where for instance, renal or hepatic disease may complicate choice.

INFORMATION NEEDS

- **The pharmacist** too, may require immediate information on drugs, this may concern straightforward matters such as dosage or availability but also involve formulation or availability data which may not be found in the manufacturer's literature.

- Quality controllers may require an alternative assay or stability data.

- **Nurses** need to know the effects and dangers of drug therapy so as to be able to assess the appearance of adverse effects, they must also know enough about preparations to teach patients to use them.

INFORMATION NEEDS

- **Researchers** need to retrieve a particular report, or search the literature.

- **Committees** need information to help them decide policies, produce hospital formularies and award contracts.

- **Patients** need to know how to take the medicines they are given, what they will feel if the drug works, likely adverse effects and what to do about them.
  - ***Measuring and accurately identifying the nature of the need is, however, not easy.***

DRUG LITERATURE

- The concept of drug information service or drug information center is an attempt to **document drugs by abstracting information about them.**
- The information about drugs is collected from various sources which are available.
- In **1972 Walton and colleagues** modeled the drug literature as a pyramid with the primary literature forming the base of the pyramid, the secondary literature interfacing and serving as a bridge from the primary literature to reference works (tertiary literature).

INFORMATION RETRIEVAL SYSTEMS

- As a **drug moves** along the path from discovery to the market and into worldwide use, **data and information about the agent are created and accumulated**. When this information is published, its value and usefulness to scientific, professional, and patient communities becomes known.

- **Publication of research results at each step of the path is essential**. There is tendency particularly in clinical research, not to publish "negative" results. When this happens we are left with only research that is favorable to the drug, resulting in a skewed picture of the drug's place in therapy.

INFORMATION RETRIEVAL SYSTEMS

- **The path of drug development** and marketing offers a structure that is **useful to scientists and practioner**s concerned with compounds of potential therapeutic value.

- The resources themselves are classified as **primary** (original research), **secondary** (indexing and abstracting services), and **tertiary** (textbooks and evaluated information).

INFORMATION RETRIEVAL SYSTEMS

- **Individual resources** are now generally available in **more than one physical format**; for example, a journal may be available as a paper publication or as an electronic publication (either individually or as part of a publisher's electronic journal collection or content collection).

- **Primary, secondary, and tertiary resources are available for each step in the path of drug development**, but reporting time increases from each step to the next.

INFORMATION RETRIEVAL SYSTEMS

- ***Preclinical Drug information:***

At this point a **compound is recognized** and then considered for potential **pharmaceutical or therapeutic usefulness**; researchers will be both consumers of and contributors to the data-information-knowledge cycle that characterizes science. Initially, in the **synthesis and purification phase** of drug development, information about the compound's chemistry and physical properties may be both sought and created. Whether or not the compound has been of interest to other researchers may be determined by searching public records of grant and contract awards and also by searching resources that cover preliminary and early research results. **The patent status of the compound may need to be established.**

PRECLINICAL DRUG INFORMATION

1. Physical and chemical data:

i) **AIDSDRUGS**: Published by the US National Library of Medicine, AIDSDRUG is a dictionary of chemical and biological agents currently being evaluated in the AIDS clinical trials covered in the companion AIDSTRIALS database.

PRECLINICAL DRUG INFORMATION

1. Physical and chemical data:

ii) **Beilstein**: Beilstein, a structure and factual database covering organic chemistry.

iii) **CAS Registry**: CAS Registry, is a substance database containing structures and chemical names.

PRECLINICAL DRUG INFORMATION

1. Physical and chemical data:

iv) **Chemcyclopedia:** It is an annual supplement to Chemical and Engineering News (C&EN), provides a listing of chemicals, trade names, packaging, special shipping requirements, potential applications and CAS Registry Numbers.

PRECLINICAL DRUG INFORMATION

1. Physical and chemical data:

v) **ChemFinder:** ChemFinder WebServer is a WWW search engine that works from a single master list of chemical compounds covering all areas of chemistry and also provide information on physical property and two-dimensional chemical structures.

PRECLINICAL DRUG INFORMATION

1. Physical and chemical data:

vi) **Chemical Abstracts:** Chemical Abstracts is a collection of chemical information with nearly 16 million abstracts of journal articles, patents, and other documents.

PRECLINICAL DRUG INFORMATION

1. Physical and chemical data:

vii) **ChemIDplus:** Published by the US National Library of Medicine, it's a web based search engine, that provides free access to structure and nomenclature authority files used for identification of chemical substances cited in National Library of Medicine databases.

PRECLINICAL DRUG INFORMATION

1. Physical and chemical data:

viii) **Chemindex plus:** Database contains 8000 pharmaceutical ingredients linked to 300,000 preparations.

ix) **Ei CompendexWeb**: It's a comprehensive bibliographic database of engineering research literature containing references to over 5000 engineering journals and conferences.

PRECLINICAL DRUG INFORMATION

1. Physical and chemical data:

x) **The Merck Index:** The Merck Index is an encyclopedia of chemicals, drugs, and biological that contains more than 10,000 monographs.

PRECLINICAL DRUG INFORMATION

1. Physical and chemical data:

xi) **NIST Chemistry WebBook:** The National Institute of Standards and Technology (NIST) Chemistry WebBook provides free access to chemical and physical property data for chemical species via the internet.

PRECLINICAL DRUG INFORMATION

1. Physical and chemical data:

xii) **RTECS:** The Registry of Toxic Effects of Chemical Substances (RTECS) is a database of toxicological information compiled, maintained, and updated by the National Institute for Occupational Safety and Health (NIOSH).

PRECLINICAL DRUG INFORMATION

1. Physical and chemical data:

xiii) **The USP Dictionary of USAN (U.S. Adopted Names) and International Drug Names:** The USP Dictionary provides comprehensive information on chemical and brand names of drugs. It includes USAN and International Non-proprietary Names (INN). It also lists drug manufacturers, therapeutic uses, and molecular and graphic formulas.

PRECLINICAL DRUG INFORMATION

2. Patents:

- Through the granting of a patent, the **U. S. Patent and Trademark Office (PTO)** provides intellectual property protection to the inventor for 20 years. U. S. Patent and Trademark Office Web Patent Databases offer free WWW access, to a bibliographic patent database that uses the most current patent classification system.

PRECLINICAL DRUG INFORMATION

2. Patents:

- **The Delphion Intellectual Property Network (IPN)** is a research tool for patent information.

- **Derwent World Patents Index (DWPI)** is a comprehensive database of patent documents published worldwide.

PRECLINICAL DRUG INFORMATION

2. Patents:

- **IMS world Drug Patents International database** provides access to the patent status of over 1200 molecules. The database contains information on patents due to expire (over a given time period), patents by therapy class, and patents by country.

INFORMATION RETRIEVAL SYSTEMS

- ***Phase IV Studies and Post Marketing Drug Information:***

✓ During the Phase IV Studies and Post Marketing Drug Information stages a thorough literature search is required to find material relevant to the clinical use of the drug.

✓ This will require not only searching the basic bibliographic databases such as Biological Abstracts, EMBASE, IDIS, IPA, MEDLINE, and Science Citation Index, but also searching the patent literature, using Patent and Trademark.

PRECLINICAL DRUG INFORMATION

Phase IV Studies and Post Marketing Drug Information:

- ✓ **Office Web Patent Databases.** The following bibliographic databases provide access to the full span of life- science periodical literature, including all stages of a compound's development from early brief reports to comprehensive assessments after years of clinical use.

PRECLINICAL DRUG INFORMATION

Phase IV Studies and Post Marketing Drug Information:

✓ **Office Web Patent Databases:**

i) **BIOSIS:** BIOSIS processes approximately 5,50,000 items each year, from primary research and review journals, books, monographs and conference proceedings. It is available in several formats. These include Biological Abstracts/RRM (Reports, Reviews, Meetings), the companion reference to Biological Abstracts.

PRECLINICAL DRUG INFORMATION

Phase IV Studies and Post Marketing Drug Information:

✓ **Office Web Patent Databases:**

ii) **EMBASE:** EMBASE, the Excerpta Medica database is a biomedical and pharmacological bibliographical database that provides access to medical and drug related subjects from over 4000 biomedical journals from 70 countries. The EMBASE database combined with unique MDLINE records back to 1966 are available in EMBASE.com.

PRECLINICAL DRUG INFORMATION

Phase IV Studies and Post Marketing Drug Information:

✓ **Office Web Patent Databases:**

iii) **International Pharmaceutical Abstracts:** IPA published semimonthly, is an abstracting/indexing publication which covers all pharmaceutical literature.

PRECLINICAL DRUG INFORMATION

Phase IV Studies and Post Marketing Drug Information:

✓ **Office Web Patent Databases:**

iv) **MEDLINE:** MEDLINE (Medical Literature Analysis, and Retrieval System Online) contains over 11 million references to journal articles in life sciences with a concentration on biomedicine from 1966 to the present. MEDLINE is available on internet through the National Library of Medicine (NLM) home page at and can be searched free of charge.

PRECLINICAL DRUG INFORMATION

Phase IV Studies and Post Marketing Drug Information:

✓ **Office Web Patent Databases:**

v) **Pubmed Central**: Pub med Central (PMC) which encompasses Medline is a web-based archive of journal literature for all of the life sciences. Access to PMC is free and unlimited.

PRECLINICAL DRUG INFORMATION

Phase IV Studies and Post Marketing Drug Information:

✓ **Office Web Patent Databases:**

vi) **Science Citation Index:** Science Citation Index (SCI) provides access to current and retrospective bibliographical information, author abstracts, and cited references found in various scholarly science and technical journals covering more than 150 disciplines.

Summary

1. The pharmacist's role in providing information on drugs and medicines is not new. When drugs were few in number and generally of relatively low potency the number of inquiries was small and could usually be answered quickly by reference to pharmacopoeias and formularies.

2. In recent years, the number of drugs and medicines has increased enormously which are usually more potent and more selective and also the literature relating to drugs has expanded at a staggering rate.

Summary

3. The literature covers a wealth of information on these newer drugs, their actions, clinical uses, unwanted effects, interactions with other drugs, comparative efficacy, etc.

4. A quick reference to pharmacopoeia and formularies is no longer sufficient, in many cases, to provide an adequate answer.

THANK YOU