Drug Utilization Studies

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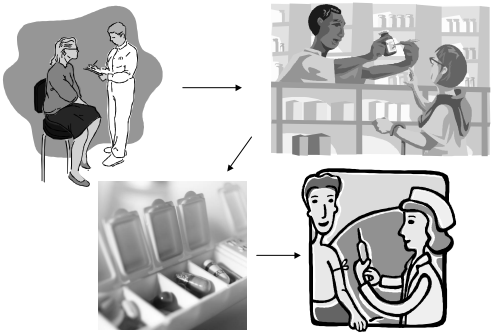
Definition

Prescription, dispensing, ingesting, marketing, distribution, and use of drugs in a society, with special emphasis on the resulting medical, social and economic consequences

Objectives of Drug Utilization

- Description of patterns of drug use in specific populations
- Identification and definition of likely problems
- General analysis of the problem
- Establishment of decisions on problem-solving
- Assessment of the effects of the action taken

Activities Involved in Drug Utilization



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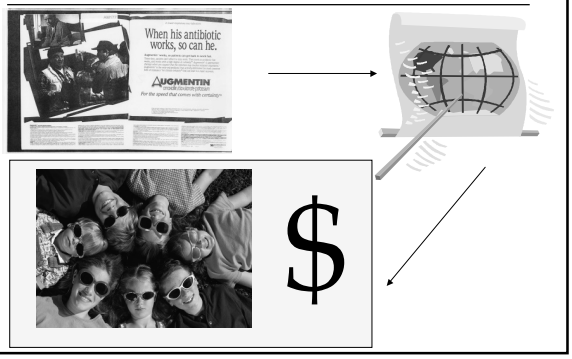

Why are drug utilization studies important?

- More new drugs in the market
- Wide variation in the patterns of drug prescribing and consumption
- Concern about delayed ADRs (e.g. FDA PMS)
- Increase drug costs

Type of Drug Utilization Studies

- Quantitative
  - Quantify current state of drug use
  - Study trends of drug use
  - Study time course of drug usage at national, regional, local or institutional levels
- Qualitative (DUR)
  - Study appropriateness of drug utilization
  - Links prescription data with drug indications

Uses of Quantitative Drug Utilization Studies

- To estimate drug utilization in populations by demographic characteristics
- Used as denominators to calculate rates of ADRs
- To monitor
  - Specific therapeutic categories
  - Effects of regulatory activities
- Markers for crude estimates of disease prevalence
- To plan importation, production & distribution
- To estimate drug expenditures

Uses of Qualitative Studies

- To study appropriateness of drug uses
  - Indications
  - Daily dose
  - Length of therapy
- To asses clinical efficacy (high intrinsic value) of most common sold drugs

Drug Utilization in Pharmacovigilance Studies

Use of drugs for wrong indications

Use of "toxic" drugs when other less toxic are available

Use of concurrent medications

Use of over/under doses

↓

Morbidity and Mortality – Medication Errors, higher disease-related complications

Poor patient compliance

Discontinuation of drugs

Drug Utilization. Coding Systems

- ATC: Anatomical Therapeutic Chemical
- AHFS: American Hospital Formulary Service System
- IDIS: Iowa Drug Information System
- AC system: Anatomical classification system

Drug Utilization Concepts

	Characteristics	**Quantitative approach**	**Qualitative approach**	**Continuous (ongoing)**
Drug Statistics (drug utilization data)	One time	Yes	No	Usually
Drug Utilization Study	One time or time limited investigations	Usually	May be	No
Drug Utilization Review (DUP, drug intervention program, drug use review, drug audit)	Assess appropriateness or attempt to change practice. They include an intervention	Usually	Yes	Yes

Drug Utilization

- Drug Statistics
- Drug Utilization Studies
- Drug Utilization Review or Drug Programs

Drug Statistics

- Drug Costs
  - Unitary cost (cost/tablet, cost/package, cost/dose, cost/treatment course)
  - Total costs
- Drug Volume
  - Number of tables, capsules or doses sold
  - Number of prescriptions
  - Number of patients ingesting drugs
- Defined Daily Dose (DDD)
- Prescribed Daily Dose (PDD)
- Minimum marketed dose (MMD)

DDD: Defined Daily Dose

- Unit of measurement that estimates the proportion of patients within a community who receive a particular drug
- Assumed average **maintenance dose** per day for a drug used for its **MAIN indication** in adults (compliance is assumed)
- Proportion of the population that may receive treatment with a particular drug

DDD: Example

$$\text{DDDs/1000 people/day} = \frac{\text{Amount of drug (mg) sold in 1 year}}{\text{DDD (mg) X 365 days X \# people}} \text{ X 1000}$$

400 million doses sold of 5 mg tablet of diazepam

DDD of diazepam = 10 mg

Population of 50 million during a 1-yr period

$$\frac{\text{5 mg tablet X 400 million doses}}{\text{10 mg X 365 days X 50 million}} \text{ X 1000} = \text{11 DDD/1000 people/day}$$

DDDs as Measure of Drug Consumption

1. DDDs/1000 inhabitants/day
   (e.g. 10 DDDs/1000 inhabitants/day = 1% of the population on average gets treatment "x" daily)
2. DDDs per 100 bed days

Drugs used during short periods

1. DDDs/ inhabitants/ year
   (e.g. 5 DDDs/inhabitant/year = the consumption is equivalent to the treatment of every inhabitant with a 5 days course during a "Y" year)

DDDs in Pharmacovigilance Studies

$$\text{Adverse Drug Reaction} = \frac{\text{Frequency of ADR}}{\text{DDD/1000 inhabitants/day}}$$

To study trends in the frequency of adverse reaction reports against trends in drug utilization

DDDs and Costs

DDDs should be used with caution to compare the costs of two formulations of the same drug.

DO NOT USE DDDs TO COMPARE COSTS OF DIFFERENT DRUGS OR DRUG GROUPS.

DDDs Uses

- To describe and compare patterns of drug utilization
- To provide denominator data to estimate ADRs
- To perform epidemiological screening for problems in DU
- To monitor the effects of informational and regulatory activities

Advantages of DDDs

- To work with gross drug statistics at various levels of the health chain
- To allow comparisons between drugs in the same therapeutic class and between different health care settings or geographic areas
- To evaluate trends over time
- Relatively easy and inexpensive

Disadvantages of DDDs

- Drugs not marketed in Nordic countries do not have DDDs
- DDD is a technical unit of comparison but not a recommended dose
- DDDs do not reflect actual prescribing patterns
- DDDs varies with drugs that have > 1 indication, have various doses, are used in combination with other drugs, drugs are used in children, do not take into account compliance variation

Prescribed Daily Dose (PDD)

- Average daily dose prescribed
- Based on actual doses ordered by physicians for new prescriptions
- It can be derived from the National Prescription Audit

Minimum Marketed Dose (MMD)

- Minimum dosage strength marketed by the manufacturer which will correspond to the minimum dose that will produce a desired therapeutic concentration

Drug Utilization

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Drug Utilization Studies

- Number of Prescriptions
  - # Prescriptions/patient (by type of prescription)
  - # First prescription/patient
  - # Refills/patient
  - Cost/prescription

Unable to provide data on quality of: indication, dose, type of patient, duration of treatment

DUS: Sources of Data

- Surveys
  - IMS America provides:
    - National Prescription Audit-measures the prescription volume that moves out of pharmacies into consumers
    - National Disease and Therapeutic Index – Represents up to 92 primary specialties grouped into 27 specialty groups
    - Mail Order Prescription Audit – measures the level of prescriptions dispensed from non-government mail-order pharmacy services via US Postal Service, United Parcel Service
  - US Department of Health and Human Services
    - National Health Care Expenditure Survey
  - National Center for Health Statistics, CDC
    - National Health Ambulatory Care
    - National Ambulatory Medical Care Surveys (NAMCS)**
  - Registries
    - Hepatic Events Registry and others

Computerized Databases

- Not diagnosis-linked
  - Drug sales
  - Drug movement at drug distribution channel level
  - Pharmaceutical or medical billing data
  - Samples of prescriptions
- Diagnosis-linked
  - Drug & morbidity data included

Non-diagnosis Linked Databases

- National Prescription Audit (IMS America) – drug distribution
- US Pharmaceutical Market (drugstores, hospitals) (drug distribution)
- Medicaid Management Information Systems (billing data)
- Saskatchewan Health Plan
- UK Prescription Pricing Authority (billing data)
- Spain's Drug Data Bank (NIH) (billing data)
- Denmark's Pharmacoepidemiologic Prescriptiion Database of the County of North Jutland

Diagnosis-linked Databases

- National Disease and Therapeutic Index (NDTI) (physician prescribing-industry)
- Kaiser Permanente Medical Plan
- Group Health Cooperative of Puget Sound
- COMPASS: Health Information Designs, Inc
- DURbase: Health Information Designs, Inc
- Sweden's Community of Tierp
- Center for Primary Care Research
- University of Uppsala, Sweden

Drug Utilization

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Drug Utilization Review or Drug Utilization Programs

- Definition: Structured, ongoing initiatives that interpret patterns of drug use in relation to predetermined criteria, and attempt to prevent or minimize inappropriate prescribing
- Objective: To improve quality and reduce costs in health care

Appropriateness

Quantitative data

Drug indications

Morbidity and mortality data

Patient or household surveys

Hospital records

Physician records

Prescription Errors in Hospitals

- Errors of Omission
- Physician ignorance on drug costs
- Failure to review medication orders
- Inability to keep update drug information
- Lack of communication between physicians and pharmacists

DUR Programs

- Formularies
- Co-payments
- Mandatory generic drug substitution
- Reference-based pricing of prescription drugs

Q&A