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A review on analytical drug utilisation

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Abstract

Drug utilization studies aim to evaluate factor related to the prescribing ,dispensing,administering,and taking of medication and its associated events.The clinical pharmacist is one of the member in the health care team.clinical pharmacist provide care to patient and that this practice can occurs in any practice setting.it provides valuable feedback about the rationality of the prescription to the doctor and various steps are performed in drug utilization process .hence, DURs are classified into three categories and future perspectives can based on various methods .This article reviews the drug utilization pattern and evalution of the process of drug utilization drug utilization reviews services include corrective action,prescriber reviews and further evaluation as a quality assurance mechanism.Drug utilization review programs as well as definition to what degree and which determinants of inappropriate prescribing are susceptible to modification and what might be an appropriate mix of interventions to achieve optimal impact merit further rigorous study. United States drug utilization research has been primarily developed at an institutional level or as part of as local health programs.

Keywords: Drug utilization, define daily dose, consumption studies, pharmacist role in due.

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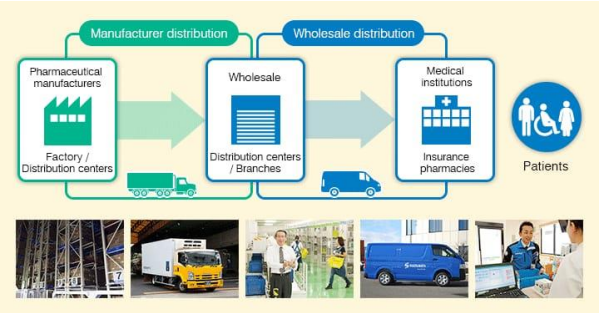
Introduction

Drug utilization research as defined by WHO (World Health Organization) is "marketing, distribution, prescription and use of drugs in a society, with special emphasis on the resulting medical, social and economic consequences". Quantitative data need to be obtained on the extent and variability in usage and costs of drug therapy, from which medical and social qualitative consequences can be utilization studies may be quantitative or qualitative In the United States drug utilization research has been primarily developed at an institutional level or as part of as local health programs . Initially a great emphasis was placed on the study of the quality of physician prescribing habits, in particular with respect to antibiotics, in both hospital and outpatient setting. In Europe, the Scandinavian countries, Scotland, and Northern Ireland pioneered the research at the national and international levels. The European drug utilization studies have been predominantly quantitative, describing and comparing patterns of use of specific groups of drugs according to geographic regions and time, showing wide variations in the utilization of drugs pertaining to several pharmaceutical classes(e.g.: anti-diabetics], non steroidal anti-inflammatory drugs [NSAIDS], antihypertensive drugs, antibiotic drugs , and lipid-lowering drugs :[1] The study aims to assess the role of Doctor Of Pharmacy in drug utilization pattern analysis in inpatient units and reporting in a tertiary care teaching hospital.

Ensuring that the drug therapy meets current standards of care

- Controlling drug cost
- Preventing problems related to medicines
- Evaluating the effectiveness of drug therapy
- Identification of areas of practice that require further education of practitioners
- Stimulating improvements in medication use
- Creating guidelines for appropriate drug utilization [2]



Historical Development of Drug Utilization

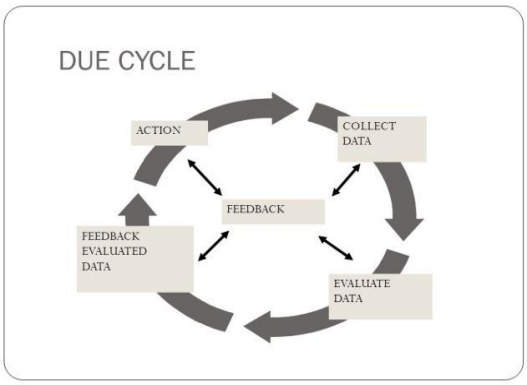
The beginning of drug utilization studies can be traced back to the early 1960s. During a symposium on drug toxicology organized by the WHO in Moscow in 1964, serious consideration was first given to major public studies of drug utilization. Similar to many other developments at the time, drug utilization had been sparked off by the thalidomide disaster. People came to the realization that if they had no idea of the scale on which (and the manner in which) such dangerous products had been employed they were not in a position to assess the frequency and location of the risks. The Moscow meeting led to a study of drug consumption in six European countries in the 1966 to 1967 period, which showed great differences in drug [3].

Scope of Drug Utilization Studies

Drug utilization studies may include descriptive epidemiological approaches to the study of drug utilization, but also the assessment of how drug utilization relates to the effects of drug use, beneficial or adverse [4].

Phases of DUE

The DUE process is a continuous cycle and it is most worthy if the cycle is conducted rather than performing various steps. The major phases of DUE cycles are,



- 1.Planning
- 2.Data collection
- 3. Evaluation
- 4. Feedback of result
- 5. Intervention
- 6. Re-evaluation [5].

DURs are classified into three categories

- **Prospective** - evaluation of a patient's therapy before medication is dispensed.
- **Concurrent** - ongoing monitoring of drug therapy during the course of treatment.
- **Retrospective** - review of therapy after the patient has received the medication.

Pharmacist's role in DUE

- Pharmacists individually and as a profession have important roles to play in positively influencing drug policy, drug use and outcomes.
- The roles and responsibilities include:
- Preparation of submissions for program justification
- Program development, supervision and coordination
- Education of hospital staff about DUE in conceptual and practical terms
- Recommendation and promotion of the goals and objectives of DUE
- Development/review of audit criteria, guidelines, study protocols and other educational material
- program outcome, effectiveness and cost benefit
- Prospective/concurrent monitoring of drug usage
- Participating as a member of hospital committees concerned with quality assurance in general and drug utilization evaluation in particular
- Presentation of DUE results at meetings and conference [6].

Steps in Conducting Due Process

Step-1: Identification of areas

Drugs for the DUE program in a hospital, a large number of drugs, which are used for the treatment. But, it is unnecessary to include each and every drug for the study. So it is better to select by the hospital DUE committee to choose the priority drugs which have to be included in the DUE program. The areas for DUE can be identified by a keen observation in the medication error reports, Adverse Drug Reaction reports, from the microbiological data and also from the feedback of prescribers and Clinical Pharmacists. ABC analysis is helpful to identify the priority drugs for inclusion in the DUE studies.

Step-2: Design of Study

Several study techniques are used in DUE studies. Observational research methods are most widely considered than experimental study methods. Pre and Post design is also an observational method used to examine before and after interventions to improve prescribing patterns

Step-3: Define criteria and standards

Criteria are always statements, which are determined earlier that can enable oneself to provide uncompromised drug use, where in the quality of actual drug use can be compared. Research literature must be used to validate the formed criteria scientifically the developed criteria should be scientifically based and supported by the research literature. This should be authentic and must have only one interpretation and also should be readily measured [7].

Step-4

Design the data collection form

It is important to have a good structure for a data collection form because a good frame reflects the accuracy of the collected data. A general aspect in the framing of a form for the collection of data is the compilation of patient information, laboratory data, etc. Along with that, the variables in a study may also influence the framing of a good data collection form. This may vary and depends on the type and objectives of DUE.

Step-5

Data Collection in the DUE study

The person who collects the data should be selected carefully. Data collectors should be familiar with the collection of data from the Patient's case note. Physicians, Pharmacists, and nurses are ideal data collectors.

Step-6: Evaluation of Result

Evaluation of data is the most critical step in Drug Utilization Evaluation. The collected data from the study should be collated using available resources. The categories of the results obtained and check the deviations if any, from the standard guidelines. If the deviations are noted, reasons for deviation should be evaluated [8].

Step-7: Feedback on results

The positive result of a DUE is influenced by the response of the findings from the hospital health care professionals who participated in the study. The results can be published in hospital newsletters, academic meetings, and DUE meetings so as to bring it to the attention of the hospital staff.

Step -8: Implementation of interventions

Once a drug use problem is identified, proper interventions have to be made. Educational or operational are interventions to improve drug use. Educational consists of meetings, academic detailing, newsletters and feedback of results. Operational intervention includes the correction of the identified operational problem by the DUE. The choice and development of interventions need careful planning [9].

Step-9: Re-evaluation

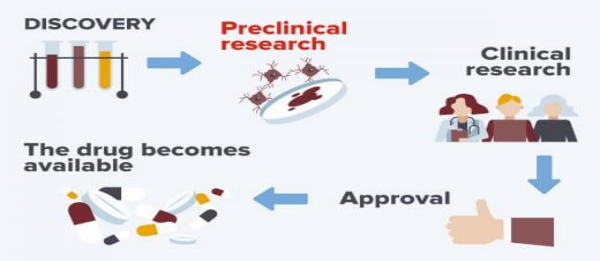
The success of a DUE is determined by the reevaluation of drug use and prescribing patterns. which can be conducted in the same procedure as done before. Re-evaluation was usually done 3-12 months after the intervention.

Step-10: Feedback on Result

It is important to inform the hospital staff regarding the result of re-evaluation. This gives a check on adopted interventions that have been made for the correction of medication use-related problems [10].

Levels of drug utilization research

- Target discovery and validation
- Lead identification and validation
- Lead optimization
- Pre clinical evaluation in vivo
- Clinical evaluation
- FDA Approval and Drug marketing



Drug utilization research can be done at various levels of health care depending on the purpose of study. Studies can be conducted at a primary health centre level by analyzing prescriptions [11]. At tertiary care level, studies can be done to compare cost effectiveness of medicines procured by pharmacy.

Future Perspectives

The study of drug utilization is an evolving field. The use of large computerized databases that allow the linkage of drug utilization data to diagnosis, albeit subject to some inherent limitations, is contributing to expand this area of study. Drug utilization studies have been having an increasing importance epidemiology by means of bridging more closely to other areas:

Public Health

From a public health perspective, the differences observed in national and international patterns of drug utilization require much further study. Many strategies aimed at modifying prescribing have been proposed and adopted. Several studies have demonstrated the efficacy of face-to-face methods in improving drug prescribing by identifying physicians who were prescribing drugs assessed as inappropriate and targeting for educational or information activity. However, drug utilization review programs as well as definition to what degree and which determinants of inappropriate prescribing are susceptible to modification and what might be an appropriate mix of interventions to achieve optimal impact merit further rigorous study.

Pharmacovigilance

Some of the actual existing databases have been developed primarily for drug safety studies the General Practice Research Database (GPRD) in the United Kingdom). Plans require extend safety knowledge, in order to investigate potential drug-drug interactions and signal detection of adverse drug reactions. Drug utilization data can be used to perform screening for patients who may be at increased risk for drug-induced illnesses, often by use of concomitant drugs, abuse or overuse of drugs. New registers offer countless possibilities for studying drug use among different groups of the society, but there is still a lot to achieve [12]. It is also important to evaluate the population, since many medicines prescribed for children are given «off-label» and surveillance of natural non-registered products, such as herbal medicines in the general population is also needed.

Pharmacoeconomics

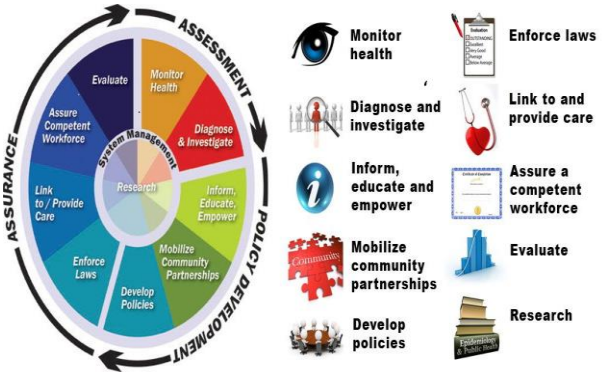
Drug utilization reviews can be used for the improvement of medical care and cost-containment, and are useful for measuring or comparing the economic impact of drug use in the population. By identifying adherence to guidelines in the current use of medicines, it is possible to reduce drugs expenditure and improve the allocation of the limited resources available, when the chosen drugs are not usually the most cost-effective.

ECO Pharmacovigilance

Pharmaceuticals are environmental pollutants .It is important to observe the differences in national and international patterns of drug utilization in order to address and minimize the environmental impact of pharmaceuticals whilst continuing to deliver patient benefit.

Pharmacogenetics

Trying to assess genetic mechanisms related to drug safety issues is also a challenge for drug utilization studies, while comparing consumers' characteristics and linking it to the benefit and risk of drugs[13].



Quantitative versus qualitative drug utilization research: Quantitative DUR used to quantify current state and trends of drug use. It involves collection, organization and display of estimates or measurement of drug use. The information is generally used for making decisions or preparing drug budgets. Data from quantitative drug use studies are generally suggestive but not conclusive in respect to quality of drug use.

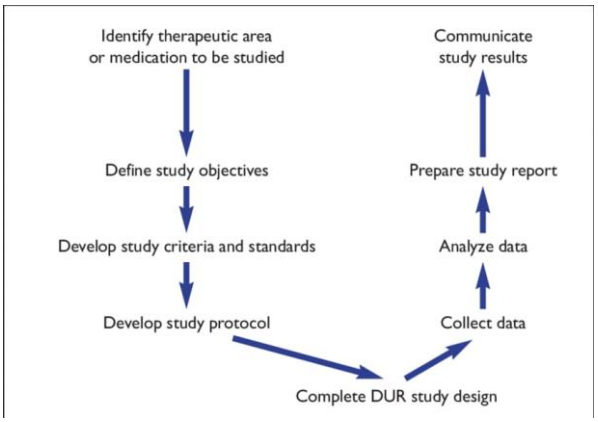
- Disease related genomics
- Target identification and validation
- Lead discovery and optimization
- Drug candidates
- Pre-clinical studies
- Clinical trial
- Drug usage[14]

Study design in drug utilization research

Observational research methods are most commonly used design in drug utilization research. It involves

observing the prescribing practices for rationality as well as observing the availability of infrastructure and other facilities required for effective provision of medicine use like availability of qualified practitioners and dispensers, availability of essential medicines, availability of NEM list and standard treatment guidelines etc [15].

Drug use studies should focus on the most important medicines, those with the highest potential problems such as high-volume medicine use, medicines with low therapeutic index, medicines with high incidence of ADR, expensive medicines, antimicrobial medicines, injections, medicines undergoing evaluation of addition to the formulary, medicines used for off-label indications or medicines used for high-risk patients.



Drug utilization research in India

Irrational use of medicines is a major problem worldwide. Data of drug utilization studies conducted in India shows irrational use of medicines. Studies conducted in psychiatric OPD of various tertiary care teaching hospitals to assess the prescribing pattern of anti-psychotic drugs reported poly pharmacy was common[16]. A prospective prescription monitoring study was carried out to investigate drug use pattern of anti-asthmatic drugs in Gujarat. Another similar study was conducted in three famous hospitals of UP. Similar study conducted in various hospitals of Gorakhpur. All these studies reported that prescribing pattern of anti-asthmatic drugs was not according to standard treatment guidelines Studies conducted in Indian clinics of psychiatry, or ENT, have found poly pharmacy of anti-epileptic drugs, anti-psychotic drugs and NSAIDs in addition to irrational use of medicines One study conducted to evaluate prescribing pattern in six departments (surgery, ENT, ophthalmology, medicine and pediatrics). Another study conducted to usage of antibiotics in outpatient facilities in 24 districts of west Bengal. Both these studies reported that use of antibiotics was inappropriate and lack of adherence to standard treatment guidelines [17]. Inappropriate or over prescribing is major driving force for the emergence of antibiotic resistance also .A report from WHO documented high rate of antibiotic resistance across a range of bacteria that cause common infections. Resistance to antibiotics is worldwide challenge to developing countries is not satisfactory.

Instruments for Data Collection on Drug Utilization

Patient files and computer registries are widely used as instruments for collecting information on drug utilization. Home inventories are also used and considered by some authors as the best method of obtaining accurate and complete drug use data [18] .Self-reported data in epidemiological studies obtained through questionnaires is commonly used as a source of drug exposure information

- Identify the therapeutic area or medication to be studied
- Define study objectives
- Develop study criteria and standards
- Develop study protocol
- Complete drug utilization review design
- Collect data
- Analyze data
- Prepare study report
- Communicate study results.

Drug Utilization Metrics and Applications

The important parameters of drug utilization are Defined Daily Dose (DDD) and Prescribed Daily Dose (PDD).

1. **Defined daily doses (DDD)***:* The Defined Daily Dose is the assumed average maintenance dose per day for a drug used for its main indication in adults [19]. DDD can be used as a tool to analyze drug utilization with the ultimate goal of improving drug use. DDD are advantageous for comparing the use of drug in hospitals or regions.

2. Prescribed Daily Dosages (PDD): The PDD is the prescribed daily dose, expressed as an amount of the Defined Daily Dose (DDD). The prescribed daily dose (PDD) is defined as the average dose prescribed according to a representative sample of prescriptions. The PDD can be determined from studies of prescriptions or medical or pharmacy records. It is important to relate the PDD to the diagnosis on which the dosage is based. The PDD will give the average daily amount of a drug that is actually prescribed.

3. Minimum Marketed Dosage [MMD]: Minimum dosage strength marketed by the manufacturer which will correspond to the minimum dose that will produce a desired therapeutic concentration [20].

LITERATURE REVIEW: The principal aim of drug utilization research is to facilitate rational use of drug in population. The objectives of the drug utilization research are to ensure that the pharmaceutical therapy meets current standards of care, to promote optimal medication therapy, to prevent medication related problems, to identify specific medicine use problems that require further evaluation, to create guidelines for appropriate medicine use, to define threshold for quality of medicine use and to control pharmaceutical cost [21].

Conclusion

A basic outline was given in this article of drug utilization. It is difficult to attempt to evaluate the effectiveness of all the drug utilization methods discussed. Since the drug cost is mostly driven by prescription of broad spectrum antibiotics, therefore hospital pharmacy should be encouraged to procure more cost effective alternative antibiotics in future. Drug utilization study continuously helps to rule out if any irrational prescribing of drugs. main objective is to provide overall health care to the society, in U.S.A and other western countries the prescribing pattern of drugs is under the control of physicians .This effectiveness of DUE can only be gained by doing study in all domains, and extrapolating the expert's knowledge from these researches can aid in determining the optimal treatment plan and continuously monitoring the quality of Pharmaceutical services a patient receives.

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