DRUG UTILIZATION REVIEW: AN OVERVIEW

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ABSTRACT

Drug Utilization, which is also called Drug Utilization Review, is a set of regular, orderly, criteria-based drug evaluations that make sure drugs are used in the right way. A drug utilization review is the same as an evaluation of how a drug is used or how it is being used. It's a way to gather information about the problems caused by drug use, and if it's done right, it can also be used to fix the problem. This makes it a factor in how drugs should be used. Evaluation of use can look at how medications are actually given or how they are given out correctly, as well as the results of treatment. As a way to make sure the quality of the service, drug utilization review services include corrective actions, prescriber reviews, and more evaluations. This article looks at how people use drugs and how the process of using drugs is evaluated. The pattern of evaluation can be put into different groups, like prospective, concurrent, and retrospective. The process of evaluating how people use drugs is a continuous cycle, and it works best when it is done as a cycle instead of in steps. This evidence-based approach to how a medication is used is meant to use the best clinical evidence available to make clear rules for a certain illness or how to use a certain medication.

KEYWORDS: Drug utilization, Drugs, Population.

INTRODUCTION

According to WHO (1997) Drug Utilization Review is defined as “the marketing, distribution, prescription and use of drugs in the society, with special emphasis on the
resulting medical, social and economic consequences.[1-3] Drug utilization review mainly focuses on:

- 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
- Promoting optimal medication therapy
- Describing the current treatment practices.[2,4-6]

**How DUR promotes rational drug use**

Drug utilization study by facilitating rational drug use ensures that drugs are available to individual patient in an optimal dose on the right indication with correct information and at an affordable price. For facilitating rational drug use it is important to know how drugs are being prescribed and used, so that we can initiate discussion and suggest measures to change the prescribing habits.[5-8] A drug utilization study does this by three different ways

1. Description of drug use patterns
2. Early signals of irrational drug use
3. Interventions to improve drug use.[8-11]

**Drug use information**

Different types of drug use information are required depending on the problem being examined. These include information about the overall use of drugs, drug groups, individual generic compounds or specific products. Often, information about the condition being treated, the patient demographic factors and the prescriber is also required. In addition, data on drug costs will be important in ensuring that drugs are used efficiently and economically. These types of drug information can be used to promote the rational use of drugs.[11-14]

**Types of drug utilization studies**

Drug utilization studies can be of the following types:
Cross-sectional studies

Cross-sectional data provide a snapshot of drug use at a particular time (e.g. over a year, a month or a day). Such studies might be used for making comparisons with similar data collected over the same period in a different country, health facility or ward, and could be drug-, problem-, indication, prescriber- or patient-based. Alternatively, a cross-sectional study can be carried out before and after an educational or other intervention. Studies can simply measure drug use, or can be criterion-based to assess drug use in relation to guidelines or restrictions.\textsuperscript{[15-17]}

Longitudinal studies

Public health authorities are often interested in trends in drug use, and longitudinal data are required for this purpose. Drug-based longitudinal data can be on total drug use as obtained through a claims database, or the data may be based on a statistically valid sample of pharmacies or medical practices. Longitudinal data are often obtained from repeated cross-sectional surveys (e.g. IMS (Intercontinental Medical Statistics) practice-based data are of this type). Data collection is continuous, but the practitioners surveyed, and therefore the patients, are continually changing. Such data give information about overall trends, but not about prescribing trends for individual practitioners or practices.\textsuperscript{[15,18,19]}

Continuous longitudinal studies

In some cases continuous longitudinal data at the individual practitioner and patient level can be obtained. Claims databases are often able to follow individual patients using a unique (but anonymous) identifier. These data can provide information about concordance with treatment based on the period between prescriptions, co-prescribing, duration of treatment, PDDs and so on. As electronic prescribing becomes more common, databases are being developed to provide continuous longitudinal data comprising full medical and prescribing information at the individual patient level. Such databases are very powerful, and can address a range of issues including reasons for changes in therapy, adverse effects and health outcomes.\textsuperscript{[15,18,20]}

Different methods to DUR studies

Three approaches to DUR

Prospective DUR (pDUR), Concurrent DUR and Retrospective DUR (rDUR).

1. Prospective DUR involves reviewing each prescription for an individual patient before it is dispensed to identify drug-related problems such as drug-drug interactions (DDIs) or
drug-disease contraindications (when disease information is available or using surrogate indicators), therapeutic duplication, or other potential adverse drug events.\cite{12,21,22}

2. Concurrent DUR involves reviewing drug orders during the course of therapy. This type of evaluation is ideal where adjustments to drug therapy may be necessary based on ongoing diagnostic and laboratory tests.\cite{12,21}

3. Retrospective DUR is performed after the prescriptions have been dispensed and “uses practice pattern analysis to identify the use of high-cost drugs, to compare particular classes of drug use by different facilities or providers, or to monitor adherence to pharmacotherapy recommendations from practice pattern guidelines for the treatment of particular diseases.\cite{12,21,23-25}

Data Collection and Evaluation

The method of data collection will vary greatly with the approaches (prospective, concurrent or retrospective) chosen in the previous step.\cite{26,27} In all cases, forms will be necessary for documenting results.

Prospective DUR

In prospective DUR, “data collection” usually requires a review of physician’s orders and comparison to criteria prior to administration of the drug. How this is accomplished, or if it is even feasible, will vary greatly between hospitals. In western-style distribution systems, where drug orders are reviewed by a pharmacist in an organized pharmacy department prior to distribution of the first dose of drug, data collection can be done in the pharmacy.\cite{28,29} In the ward-stock systems frequently seen in Russian hospitals, prospective DUR is only possible if a qualified “data collector” is available to review orders prior to administration by a nurse. In systems where the department chief reviews all drug orders prior to administration, this individual could also function in the capacity of DUR data collector.\cite{28,30,31}

Various drug use problems can be detected and prevented from occurring with prospective monitoring, such as.

- Incorrect dosage
- Inappropriate dosage form/route of administration
- Incorrect duration of therapy
- Drug-drug interactions
• Therapeutic duplication
• Drug-disease contraindications
• Drug-allergy and other side effects
• Incorrect laboratory/monitoring,\textsuperscript{[30,32,33]}

**Concurrent DUR**
Concurrent DUR data collection is similar to prospective in that it may be done in the pharmacy, or on the wards. It differs from prospective in that the data collection does not have to occur prior to administration of a first dose. This method of data collection is most suitable when staffing permits a daily review of case histories. The main difference between the two types is that with concurrent monitoring, interventions are corrective.\textsuperscript{[32,34]}

**Retrospective DRU**
Retrospective DUR involves reviewing prescribed drugs after they are dispensed to the patients. It presents the fewest problems with data collection, and therefore is often the method of choice in new programs. Since almost all required data elements are contained in case histories, data collectors typically work in cooperation with the medical records department. Retrieval of data elements that are not contained in the case history, such as drug prices, may require visits to ancillary departments.\textsuperscript{[34,35]}

Its chief drawback is that interventions cannot be made to improve drug use for the patients whose records were reviewed.\textsuperscript{34} It can be used to monitor the same aspects of drug use listed for prospective DUR, as well as:

• Identifying prescribing frequency of a single drug or class of drugs
• Comparing drug prescribing among physicians
• Comparing prescribing to standard treatment guidelines
• Monitoring the therapeutic use of high cost drugs.\textsuperscript{[34]}

**Drug Utilization Metrics and Applications**
The important parameters of drug utilization are Defined Daily Dose (DDD) and Prescribed Daily Dose (PDD).\textsuperscript{[36]}

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. 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.\textsuperscript{[37,38]}
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.[37]

**Drug use indicators**

The indicators developed by WHO help in assessing drug use pattern in particular setting. There are three core indicators in addition to complimentary indicators. The three main indicators deal with the three areas in rational drug use - Prescribing practices by health care professionals, patient care and facility standards.[39-42] Prescribing data are usually extracted from outpatient and inpatient prescription forms.

<table>
<thead>
<tr>
<th>Indicators[40]</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prescribing indicators</strong></td>
<td></td>
</tr>
<tr>
<td>Average number of medicines per encounter</td>
<td>To measure the degree of poly pharmacy</td>
</tr>
<tr>
<td>Percentage of medicines prescribed by generic name</td>
<td>To measure the tendency to prescribe by generic names</td>
</tr>
<tr>
<td>Percentage encounters with an injection prescribed</td>
<td>To measure the overall use of an important but commonly overused and costly form of drug therapy.</td>
</tr>
<tr>
<td>Percentage of medicines prescribed from essential medicine list/ hospital formulary</td>
<td>To measure the degree to which practice conforms to national drug policy</td>
</tr>
<tr>
<td><strong>Patient care indicators</strong></td>
<td></td>
</tr>
<tr>
<td>Average consultation time</td>
<td>To measure the time that medical personnel spend with patients in the process of consultation and prescribing.</td>
</tr>
<tr>
<td>Average dispensing time</td>
<td>To measure average dispensing time that personnel dispensing drugs spends with the patients</td>
</tr>
<tr>
<td>Percentage of medicines actually prescribed</td>
<td>To measure the degree to which health facilities are able to provide the drugs, which were prescribed</td>
</tr>
<tr>
<td>Percentage of drugs actually labeled</td>
<td>To measure the degree to which, dispenser record essential information on drug package, they dispense</td>
</tr>
<tr>
<td>Percentage of patients with knowledge of correct doses</td>
<td>To measure the effectiveness of information given to the patient on the dosage schedule of drugs they receive.</td>
</tr>
<tr>
<td><strong>Facility indicators</strong></td>
<td></td>
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</tbody>
</table>
| Availability of EML or formulary | To indicate the extent to which copies of EML or
Availability of key drugs | To measure the availability of key drugs recommended for treatment of some common health problems at health facilities

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of patients treated without drugs</td>
<td>To measure the degree to which primary care prescribers treat patients with non pharmacological treatment.</td>
</tr>
<tr>
<td>Average drug cost per Encounter</td>
<td>To measure the cost of drug treatment</td>
</tr>
<tr>
<td>Percentage of drug cost spent on Injections</td>
<td>To measure the overall cost of an important but commonly overused form of drug therapy</td>
</tr>
<tr>
<td>Percentage of patients satisfied with the care they receive</td>
<td>To measure the extent to which patients leave health facilities generally satisfied with the overall care they received</td>
</tr>
<tr>
<td>Percentage of health facilities with access to impartial drug information</td>
<td>To determine whether accurate and unbiased information about the drugs is locally available to prescribers</td>
</tr>
<tr>
<td>Prescription in accordance with treatment guidelines</td>
<td>To measure the quality of care for some important health conditions where clear standards of treatment exist locally.</td>
</tr>
</tbody>
</table>

The steps of a Drug Utilization Evaluation (DUE)\(^{[44-47]}\)

**Step 1 Establish responsibility**

It is the responsibility of the DTC to establish procedures for the implementation of a DUE program; this includes appointing a responsible member of the DTC or a subcommittee to monitor and supervise the DUE process in the hospital or clinics. Ideally the DTC should establish annual plans, outlining which medicines or clinical conditions will be a part of the DUE process.\(^{[46,48]}\)

**Step 2 Develop the scope of activities and define the objectives**

The DTC should decide upon the objectives of the DUE and the scope of the activities necessary.\(^{[49]}\) The scope can be very extensive or it can focus on a single aspect of drug therapy and will depend upon the type of problem identified, for example:

- Overuse of a more expensive medicine when a cheaper equivalent is available, as revealed in aggregate data
- Incorrect use (indication, dosage, administration) of a particular drug, as revealed in patient charts, medication error reports, ADR reports
- Inappropriate choices of antibiotic, as revealed in antibiotic sensitivity reports
- A poor dispensing process, as revealed by patient complaints or feedback.\(^{[46,50,51]}\)
Due to the large number of medicines available at a hospital or clinic, the DTC must concentrate on those medicines with the highest potential for problems in order to get the most return on the work involved.\textsuperscript{50,52,53} These high-priority areas include:

- High-volume drugs
- Expensive drugs
- Drugs with a narrow therapeutic index
- Drugs with a high incidence of ADRs
- Critically important therapeutic categories, for example cardiovascular, emergency, toxicology, intravenous drugs, chemotherapy and narcotic analgesics
- Antimicrobial drugs, prophylactic and therapeutic
- Drugs undergoing evaluation for addition to the formulary
- Drugs used for non-labeled indications
- Drugs used in high-risk patients
- Common clinical conditions often poorly treated.\textsuperscript{50,54}

**Step 3 Establish criteria for review of the medicine**

An Establishing DUE criterion is extremely important, and is the responsibility of the DTC. DUE criteria are statements that define correct drug usage with regard to various components. Criteria for the use of any medicine should be established using the hospital’s STGs (assuming that they have been correctly developed). In the absence of hospital STGs, criteria may be based on recommendations from national or other locally available satisfactory drug use protocols, other relevant literature sources, and/or recognized international and local experts.\textsuperscript{54,55} Credibility, and staff acceptance, of the DUE relies on using criteria that have been developed from reading established evidence-based medicine information from reputable sources and that have been discussed with prescribers.\textsuperscript{55}

- **Uses:** Appropriate indication for drug, absence of contraindications
- **Selection:** Appropriate drug for clinical condition
- **Dosing:** Indication-specific dosing, intervals and duration of treatment
- **Interactions:** Absence of interactions – drug-drug, drug-food, drug-laboratory
- **Preparation:** Steps involved with preparing a drug for administration
- **Administration:** Steps involved in administration, quantity dispensed
- **Patient education:** Drug and disease-specific instructions given to patients
- **Monitoring:** Clinical and laboratory
- **Outcome, for example:** Decreased blood pressure, blood glucose, asthma attacks
Reviewing many criteria will make the DUE process more difficult, and may impair successful completion of the review. Therefore the number of criteria established for each medicine is often between 3 and 5. Once the criteria are established, thresholds or benchmarks are decided for each criterion in order to define the expectations or goals for compliance with the criteria. Ideally one would like 100% of all cases to comply with the criteria, but in reality this may not be possible, and a DTC might decide to set a threshold of 90–95% compliance below which they would instigate corrective action.[55-57]

**Step 4 Data collection**

Data may be collected retrospectively, from patient charts and other records, or prospectively, at the time a medicine is prepared or dispensed. Retrospective data collection may be quicker and is best accomplished away from the patient care areas and distractions. The advantage of a prospective review is that the reviewer can intervene at the time the medicine is dispensed to prevent errors in dosage, indications, interactions or other mistakes. A particular example of this is the computerized systems used in some pharmacies; here the computer warns the pharmacist if patient data being entered into the computer fails to meet established criteria and requires them to correct the problem(s) noted. Such a system can also provide a large database for use retrospectively. Data must be collected from a suitable random sample of charts or prescription records from the health-care facility, usually selected by pharmacy personnel, but also by nurses or medical records personnel.[57] The treatment of at least 30 patients, or 100 patients for common clinical conditions, should be reviewed per health facility or hospital. The larger the facility and the more practitioners, the larger the number of records needed for review and analysis. Data collection forms based on the criteria can be configured into simple ‘yes/no’ questions or may involve the filling in of open questions. Sources of data include patient charts, dispensing records, medication administration records, laboratory reports, ADR reports, medication error reports, antimicrobial sensitivity reports, and documented staff and patient complaints.

**Step 5 Data analysis**

Data are tabulated in a form that corresponds to the criteria chosen for the DUE. The percentages of cases that meet the threshold for each criterion should be calculated and summarized for presentation to the DTC. A report of all DUE programs that are being conducted should be prepared on a quarterly basis.
Step 6 Feedback to the prescribers and making a plan of action

After information is presented, the DTC should develop conclusions about the differences between actual and desired results. The DTC should then decide what follow-up action is necessary and whether to continue, discontinue or expand the functions of the DUE in question. Recommendations should include specific steps to correct any drug use problem that is evident from performing the DUE. For example, if a specific medicine is being prescribed at too high a dose, the recommendations need to specify in detail how the dosing of this medicine can be improved. Interventions to improve drug use would include feedback to the prescribers and may also include:

- Education, for example letters, in-service education, workshops, newsletters, face-to-face discussions
- Institution of drug order forms
- Institution of prescribing restrictions
- Changing the formulary list and/or manual
- Changing the standard treatment guidelines.[58]

Step 7 Follow-up

In every DUE, follow-up is critical to ensure appropriate resolution of any problems. If an intervention is not evaluated, or drug use problems are not resolved, then the DUE will have been of no use. As a part of a follow-up plan the DTC must assess the need to continue, modify or discontinue the DUE. Thus, DUE activities should be evaluated regularly (at least annually) and those that do not have a significant impact on drug use should be redesigned in order to provide measurable improvements.[58]

Common problems associated with DUEs include unclear responsibilities for different activities, poor prioritization of problems, lack of documentation, lack of personnel and inadequate follow-up. If follow-up is adequate, prescribers are likely to improve their performance in all areas knowing that they may be reviewed in the future.[59,60]

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.[61-63] 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;
Documentation of 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 conferences.\(^{[62,63]}\)

CONCLUSION

For the benefit of patients, it is necessary to design and implement therapeutic management recommendations. These guidelines assist medical professionals in prescribing pharmaceuticals based on evidence, so enhancing the quality of drug use as a whole. Continually excluding irrational prescribing of medications is aided by drug use research. 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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