World Journal of Biology Pharmacy and Health Sciences
eISSN: 2582-5542
Cross Ref DOI: 10.30574/wjbphs
Journal homepage: https://wjbphs.com/

(RESEARCH ARTICLE)

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Drug utilisation and evaluation of medicine

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World Journal of Biology Pharmacy and Health Sciences, 2025, 21(03), 442-451

Publication history: Received on 30 January 2025; revised on 07 March 2025; accepted on 10 March 2025

Article DOI: https://doi.org/10.30574/wjbphs.2025.21.3.0271

Abstract

Background: Inappropriate medication use can lead to adverse drug events, reduced therapeutic outcomes, and increased healthcare costs. Drug Utilization Review (DUR) is a systematic process aimed at optimizing medication use.

Objective: To evaluate the impact of DUR on medication use patterns and patient outcomes in a tertiary care setting.

Methods: A retrospective, observational study was conducted, analyzing 100 prescriptions over a 3-month period. Clinical pharmacists performed DUR, identifying potential medication-related problems and recommending interventions.

Results: DUR indicates that drug interactions are a significance concurrent in the patient's current treatment regimen, with 63 prescription drug interacted and 37 not interacted, thus it leading to improved patient outcomes and reduced healthcare costs.

Conclusion: This study demonstrates the effectiveness of DUR in optimizing medication use, enhancing patient safety, and promoting cost-effective prescribing practices.

Keywords: Prescription; Drug utilization review; Drug; Interactions; Healthcare costs

1. Introduction

Drug utilization review (DUR) is defined as authorized, structured, ongoing review of prescribing, dispensing and use of medication. It involves a review of patient prescription and medication data before, during and dispensing to ensure appropriate medication decision – making and positive outcome. Drug utilization review aims to enhance the patient safety, improve medication effectiveness, promote cost – effective therapy, ensure compliance with guidelines, identify medication waste, optimize medication use, improve prescribing practice. DUR is a performance improvement method that evaluates and improves medication-use processes to optimize patient outcomes[1].

Drug Utilization Review (DUR) is an ongoing, systematic quality-improvement activity constructed to ensure the effective and appropriate use of medicines. It can also be considered a formulary system management technique. It comprises a comprehensive review of a patient's health and medication history before, during, and after dispensing medicines to optimize patient outcomes. As a result, it provides quality assurance, prescriber feedback, corrective action, and additional evaluations. Hence, DURs performed by pharmacists improve the quality of patient care, enhance therapeutic outcomes, prevent adverse drug reactions, and reduce inappropriate pharmaceutical expenditures, reducing overall healthcare costs[2].

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DUR is an authorized and structured ongoing review of practitioner prescribing, pharmacist dispensing and patient use of medications. The purpose of DUR is to ensure drugs are used appropriately, safely and effectively to improve patient health status. Predetermined criteria for appropriate drug therapy are compared against a patient's or a population's records. Non-adherence to criteria results in drug therapy changes. In addition, continual improvement in the appropriate, safe and effective use of drugs has the potential to lower the overall cost of care. DUR allows the pharmacist to document and evaluate the benefit of pharmacy intervention in improving therapeutic and economic outcomes while demonstrating the overall value of the pharmacist[3].

1.1. Pharmacovigilance

Pharmacovigilance is a branch of clinical pharmacy in which drug-induced unknown adverse effects and their risk factors are detected and studied to prevent iatrogenic disease and promote safe and rational use of drugs. The WHO defined pharmacovigilance as "the science and activities relating to the detection, assessment, understanding and prevention of adverse effects or any other medicine-related problem"[4].

1.2. Spontaneous case reports

Spontaneous reporting systems provide information about serious and unpredicted drug reactions. They are relatively inexpensive „early warning systems" that inform about any potential problems observed during the post-marketing phase of a drug. Once the clinical trial is completed, the drug is marketed and prescribed to a population that usually differ to a great extent from the population on which it was tested during the clinical trials (**e.g.,** elderly people, people with co-morbidity patterns that differ from the trial populations, pregnant women or children). Spontaneous reporting systems do not provide any information about the population consuming a certain drug and the duration of therapy[5].

Aim

The primary aim of drug utilization review is to enhance patient safety by reducing medication error.

Objectives

- To evaluate and improve patient adherence to medication.
- To minimize waste and promote cost effective treatment options.
- To identify and address potential drug – drug, drug-food, drug -disease interaction.
- To regularly review medication use practices to identify areas for improvement and implement changes to optimize patient care.
- To ensure that medication is used in a way that maximize their benefits and minimizes their risk.
- To optimize medication, use to minimize waste, reduce unnecessary spending and promote cost effective treatment.
- By achieving these objectives, DUR programs can help ensure that medication are used safely, efficiently, leading to better health outcomes and improve patient care.

2. Methodology

To assess DUR, a study is going to be conducted in Multispeciality hospital on patient prescription.

The study of DUR can be done by following ways:

- Health records of the patients is the main data source for DUR data collection.
- Collect relevant data (e.g. Patient medication history)
- Analyse the data.
- Identify potential issues (e.g. Over dose)
- Collect relevant data (e.g. Patient medication history)
- Analyse the data.
- Identify potential issues (e.g. Over dose)
- Asses intervention impact.
- Get feedback from patient and prescriber.
- Report, finding to relevant stakeholders (e.g. Healthcare organization, regulatory agencies).

3. Result

Table 1 Total number of drug interaction (n=100)

Number of drug interacted	Number of drug not interacted
63	37

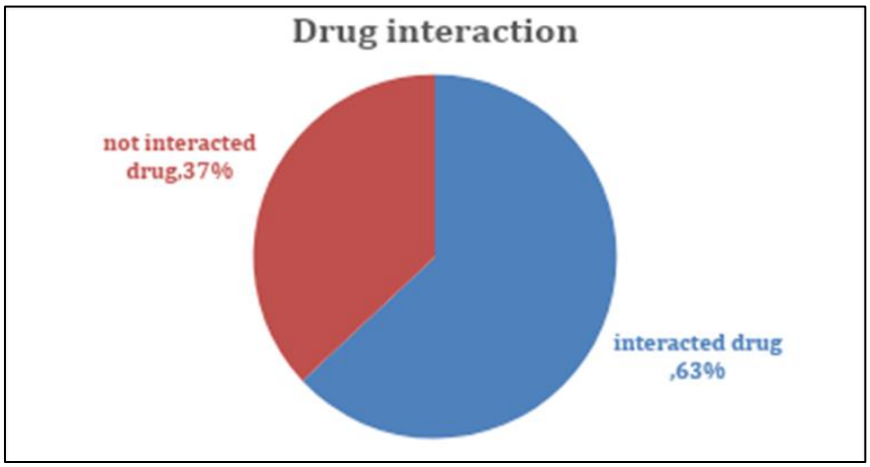

Figure 1 Total number of drug interaction

Table 2 Drug interaction in in-patient and out-patient

Type of patient	Drug interaction	Percentage
In patient	21	33%
Out patient	42	66%

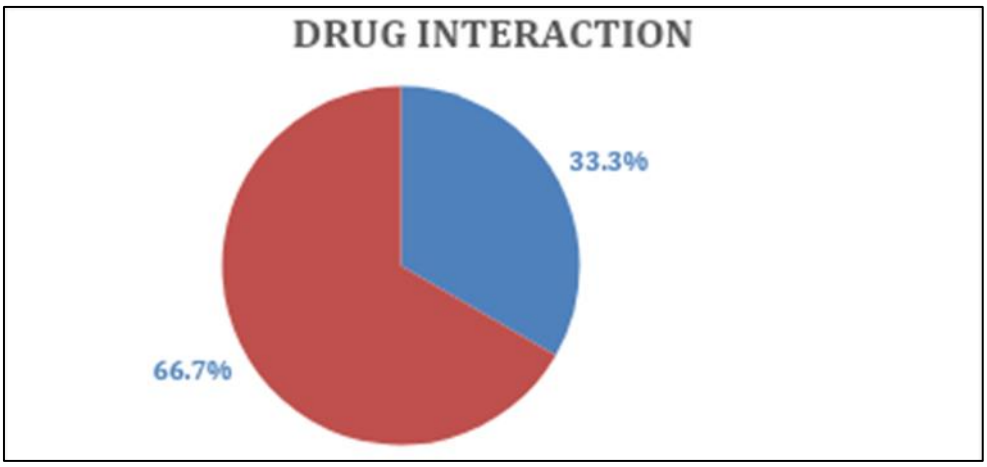

Figure 2 Drug interaction in in-patient and out patient

Table 3 Total number of drug and food interacted in patients

Type of interaction	Total number of interactions	Percentage
Drug interaction	**63**	**63%**
Food interaction	**26**	**26%**

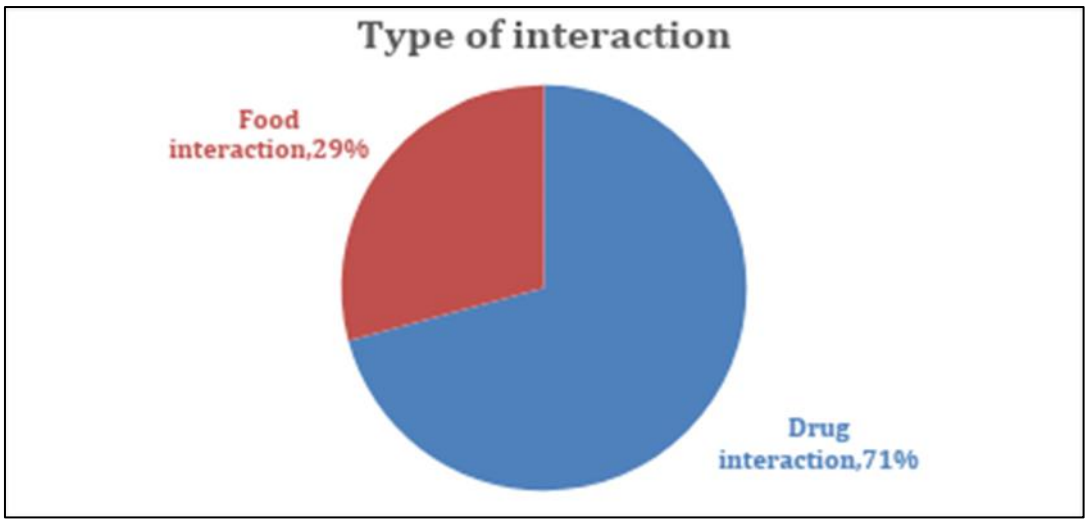

Figure 3 Total number of drug and food interacted in patients

Table 4 Total number of drugs interacted n=388

Drugs	Count	Percentage
Number of drugs interacted	160	41%
Number of food interacted	86	22%

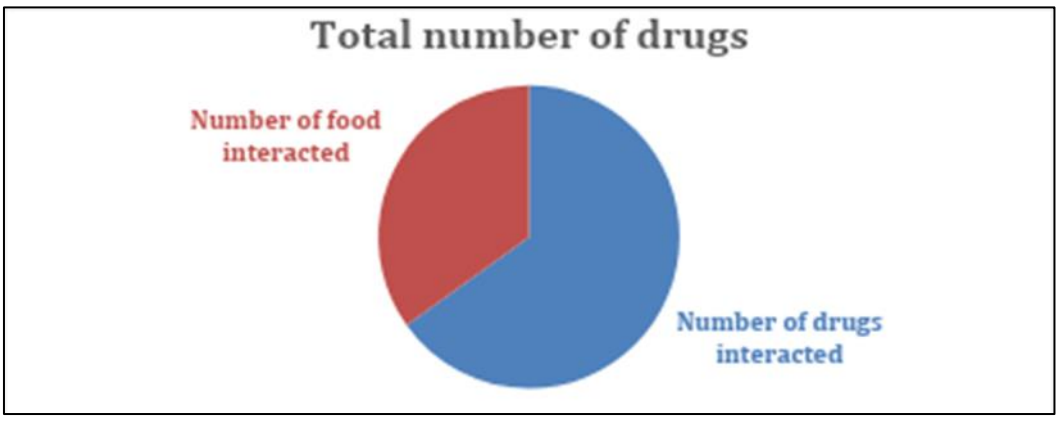

Figure 4 Total number of drugs interaction

Table 5 Classification of drug interaction

Classification	Interaction count	Percentage

Minor	16	10%
Moderate	40	25%
Major	75	46.8%

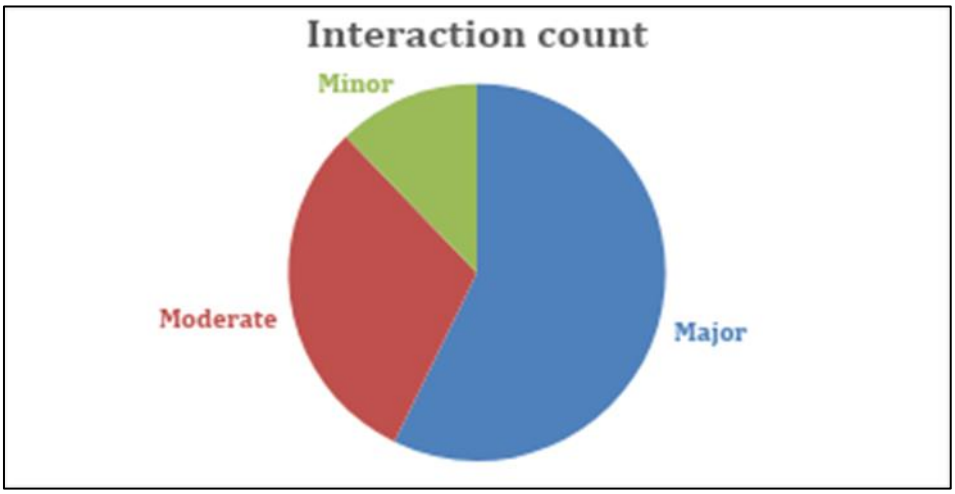

Figure 5 Classification of drug interaction

Table 6 Classification of food interaction n=86

Classification	**Interaction count**	**percentage**
Major	57	66.2%
Moderate	29	33.7%

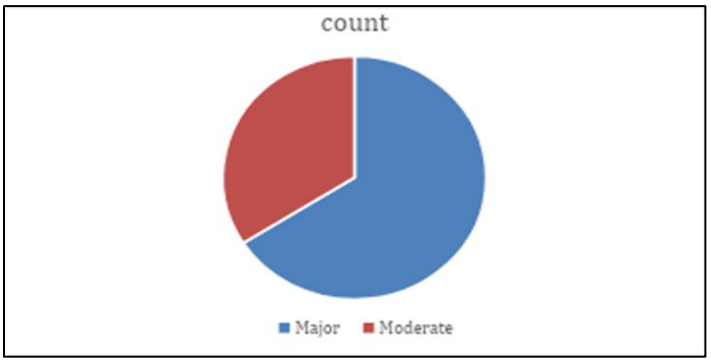

Figure 6 Classification of food interaction

Table 7 Classification of interaction based on gender

Gender	**No.of patient**	**Interacted patient**
Male	40	30
Female	60	40

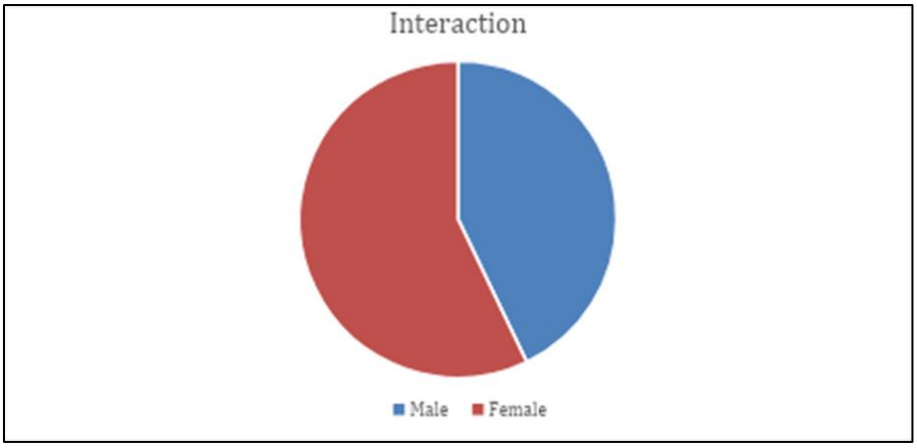

Figure 7 Classification of interaction based on gender

4. Discussion

Drug Utilization Review (DUR) can be performed to assess the appropriateness, safety, and efficacy of the prescribed drug regimen. Here's how we can break down the data and discuss each aspect:

4.1. Drug Interactions - 67 Interactions Identified

Assessment: A high number of drug interactions (67) suggests that the prescribed medications could pose potential risks to the patient due to interactions between drugs. These interactions can result in altered pharmacokinetics or pharmacodynamics, leading to reduced therapeutic efficacy, increased toxicity, or even new adverse effects.

4.1.1. Actions

- **Review the interactions:** Categorize these interactions by their severity (e.g., major, moderate, or minor). Focus on the major interactions that could pose significant risks to the patient's health.
- **Consult with prescribing physician:** Recommend alternative drugs or adjust dosages to mitigate significant interactions. For instance, a drug with a known interaction could be substituted with one that has a safer profile or adjusted to a lower dose.
- **Monitor patient closely:** For interactions that are unavoidable, ensure that the patient is monitored for potential adverse effects and laboratory tests as necessary.

4.2. Drugs Not Interacted - 37

4.2.1. Assessment

These are drugs in the regimen that do not interact with others, suggesting that their use is less likely to cause problems due to lack of pharmacological interference with other drugs.

4.2.2. Actions

- **Validate the treatment plan:** Ensure that the non-interacting drugs are appropriate for the patient's condition. Even though no interactions are noted, assess their overall appropriateness and efficacy.
- **Consider optimization:** If a more effective or safer alternative is available for these non-interacting drugs, explore that option.

4.3. Food Interactions - 26

4.3.1. Assessment

Food interactions (26) can impact drug absorption, metabolism, or excretion. Certain foods can either increase or decrease the effectiveness of medications or cause unwanted side effects.

4.3.2. Actions

- **Provide dietary counselling:** Advise the patient about foods they should avoid or foods that may enhance the effectiveness of certain drugs (e.g., grapefruit with statins).
- **Patient education:** Provide clear guidance on timing the intake of food relative to medication (e.g., with meals or on an empty stomach).
- **Adjust prescriptions if necessary:** If food interactions are significant (e.g., affecting bioavailability), consider switching to medications with fewer dietary restrictions.

4.4. Drug Interactions (Repeat) - 63

4.4.1. Assessment

It seems like there is a second count for drug interactions (63), which may be either a more specific subset of the first 67 interactions or another set of interactions. If this is not a mistake, it warrants clarification.

4.4.2. Actions

- **Clarify the discrepancy:** Check if the 63 drug interactions are distinct from the original 67, or if there's overlap. If they are a subset, review the more critical interactions, as this may highlight additional risks not captured in the original count.
- **Take the necessary actions for critical interactions:** If 63 interactions are major and can lead to serious adverse effects, prioritize the most harmful interactions for intervention.

4.5. Overview of the Results Major Interactions (75)

These interactions are potentially harmful and can result in severe adverse effects or reduce the effectiveness of therapy. Major interactions often require immediate action, such as adjusting the dosage, changing medications, or avoiding combination therapy altogether.

4.5.1. Moderate Interactions (40)

These interactions may cause discomfort or non-serious side effects. While they are not as dangerous as major interactions, they still require caution. Adjusting dosages or monitoring for symptoms may be necessary.

4.5.2. Minor Interactions (16)

These are generally considered less critical and usually do not require major changes in treatment. However, healthcare providers should still be aware of them, as they can lead to slight discomfort or affect drug absorption or metabolism.

4.6. Analysing Major Interactions

4.6.1. Importance of Monitoring

The presence of 75 major interactions suggests a need for close monitoring of the patient population being assessed. These interactions could have serious consequences, such as organ toxicity, severe drug reactions, or life-threatening conditions.

4.6.2. Intervention

Immediate interventions should be considered for major interactions, including

- **Medication Substitution** - Switching to a safer alternative.
- **Dose Adjustment** - Reducing or increasing the dose to mitigate risks.
- **Patient Counselling** - Educating patients on the risks and signs to watch for.

4.6.3. Reviewing High-Risk Medications

It is critical to identify which specific drugs are causing these major interactions to determine if any high-risk medications can be avoided or replaced with safer options.

4.7. Moderate Interactions

4.7.1. Monitoring and Adjustments

With 40 moderate interactions, a careful review of therapy should be conducted. While these interactions may not pose immediate threats, they could lead to suboptimal therapeutic outcomes or unwanted side effects.

4.7.2. Patient Education

Providing patients with adequate information about these moderate interactions and what symptoms to look for can help mitigate risks. Monitoring may include adjusting doses or checking for any new adverse effects.

4.7.3. Clinical Judgment

The healthcare provider should use clinical judgment to decide whether to adjust the treatment regimen or proceed with more frequent follow-ups.

4.8. Minor Interactions

4.8.1. Minimal Risk

Minor interactions are generally not harmful but still warrant documentation. For instance, certain drugs may slightly affect the absorption or bioavailability of others, but typically, these do not result in significant health issues.

4.8.2. Patient Reassurance

In many cases, minor interactions can be monitored without any drastic changes. However, it's essential to provide reassurance to patients and ensure they understand the nature of these minor interactions.

4.9. Prioritizing Interactions

4.9.1. Risk-Based Approach

The major interactions (75 in total) should take precedence in clinical decision-making. A risk-based approach should focus on preventing, monitoring, and managing these high-risk interactions.

- **Moderate Interactions (40)** can be reviewed during routine follow-ups, with dose adjustments or monitoring based on individual patient circumstances.
- **Minor Interactions (16)** are the least concerning but still require documentation, and no immediate action is typically needed unless the patient experiences re.lated side effects.

4.10. Potential Causes and Solutions

4.10.1. Polypharmacy

The high number of major and moderate interactions may indicate polypharmacy, especially in older populations or those with chronic conditions. Regularly reviewing the patient's medication list and eliminating unnecessary drugs may reduce potential interactions.

4.10.2. Medication Reconciliation

A thorough medication reconciliation process is vital to ensure that the patient is not prescribed drugs that interact harmfully.

4.10.3. Use of Drug Interaction Databases

Utilizing comprehensive drug interaction checkers can aid healthcare providers in identifying and addressing potential issues before prescribing.

4.11. Improvement Strategies

4.11.1. Education and Training

Ensuring that healthcare providers, especially prescribers and pharmacists, are well-informed about drug interactions can reduce the incidence of inappropriate prescribing.

4.11.2. Patient-Centered Care

Collaborating with patients and involving them in discussions about their medications and potential interactions can lead to better therapeutic outcomes.

4.11.3. Regular Reviews

Conducting regular reviews of medication regimens, especially for patients on chronic therapies or those taking multiple medications, is a good strategy to prevent harmful interactions.

5. Conclusion

In summary, the DUR indicates that drug interactions are a significant concern in the patient's current treatment regimen, with 67 drug interactions (63 listed separately), along with 26 food interactions. A comprehensive review and intervention are necessary to reduce risks and improve patient outcomes. Actions should focus on:

- Prioritizing the management of major drug interactions and food interactions.
- Collaborating with the prescribing physician to modify the drug regimen where possible.
- Ensuring patient education regarding the importance of timing medications and food consumption.
- Monitoring for potential adverse effects or therapeutic failure.

The goal of the DUR is to optimize therapy, enhance safety, and ensure that the treatment plan is as effective and safe as possible.

A Drug Utilization Review (DUR) is an important process to ensure the safe and effective use of medications. The results you provided indicate the number of drug interactions identified, categorized as major, moderate, and minor. Here's a breakdown of the discussion for the given results:

The DUR results highlight significant concerns regarding the presence of major drug interactions. While moderate and minor interactions are still relevant, the primary focus should be on managing the major interactions to ensure patient safety. A structured approach to monitoring, education, and medication review will help minimize these risks and optimize therapeutic outcomes.

Compliance with ethical standards

Acknowledgments

I convey my acknowledgement to the management of Shri indra Ganesan institute of medical science college of pharmacy, Manikandam, Tiruchirappalli, Tamil Nadu,India.

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in study.

References

[1] Pradeep Kumar Thakur et al,. Department of pharmacy practice studied on a prospective study on drug utilization and evaluation of corticosteroids among out-patients of teaching hospital . International journal of pharmacy teaching and practices 2015, vol.6, issue 4,2630-2634.

[2] Carver N, Jamal Z, Dering Anderson AM. Drug Utilization Review. [Updated 2023 Apr 23]. In: Star Pearls [Internet]. Treasure Island (FL): Stat Pearls Publishing; 2024 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK441869/

[3] Deshpande PR, Vantipalli R, Chaitanya Lakshmi CH, Rao EJ, Regmi B, Ahad A, Nirojini PS.Clinical pharmacists: The major support to Indian healthcare system in near future. J Pharm Bioallied Sci. 2015 Jul-Sep;7(3):161-74. doi: 10.4103/0975-7406.160005. PMID: 26229349; PMCID: PMC4517317.

[4] Francis J, Abraham S. Clinical pharmacists: Bridging the gap between patients and physicians. Saudi Pharm J. 2014 Dec;22(6):600-2. doi: 10.1016/j.jsps.2014.02.011. Epub 2014 Mar 12. PMID: 25561874; PMCID: PMC4281611.

[5] Parthasarathi G, Karin Nyfort-Hansen, Milap C Nahata. *A textbook of Clinical Pharmacy Practice- essential concepts and skills.*