Evaluating the Role of Clinical Pharmacists in Oncology: A Systematic Review of Interventions and Patient Outcomes

[1]Hassan Saeed Alzahrani, [2]Wid Alyamani, [3]Nader Mohammed Alobaidi, [4]Zaher Abdullah Albargi, [5]Alaa Salem Almihmadi, [6]Hazem Mansour Alharbi, [7]Mohammad Abdullah Frran, [8]Bandar Mohammad Mojammami, [9]Sultan Meshkas Alsherif, [10]Abdullah Obaid Alotaibi, [11]Shadi Mohammad Alsalmi, [12]Khalid Awad Alqarni,

[1]loopleon@gmail.com, Pharmacy technician, Pharmaceutical Services Administration, King Abdullah Medical City, Makkah, kingdom of Saudi Arabia

[2]Pharmacist, Pharmaceutical Services Administration, King Abdullah Medical City, Makkah, kingdom of Saudi Arabia.

[3]Pharmacy technician, Pharmaceutical Services Administration, King Abdullah Medical City, Makkah, kingdom of Saudi Arabia.

[4]Pharmacy technician, Pharmaceutical Services Administration, King Abdullah Medical City, Makkah, kingdom of Saudi Arabia.

[5]Pharmacy technician, Pharmaceutical Services Administration, King Abdullah Medical City, Makkah, kingdom of Saudi Arabia.

[6]Pharmacy technician, Pharmaceutical Services Administration, King Abdullah Medical City, Makkah, kingdom of Saudi Arabia.

[7]Pharmacy technician, Pharmaceutical Services Administration, King Abdullah Medical City, Makkah, kingdom of Saudi Arabia.

[8]Pharmacist, Pharmaceutical Services Administration, King Abdullah Medical City, Makkah, kingdom of Saudi Arabia.

[9]Pharmacy technician, Pharmaceutical Services Administration, King Abdullah Medical City, Makkah, kingdom of Saudi Arabia.

[10]Pharmacy technician, Pharmaceutical Services Administration, King Abdullah Medical City, Makkah, kingdom of Saudi Arabia.

[11]Pharmacy technician, Pharmaceutical Services Administration, King Abdullah Medical City, Makkah, kingdom of Saudi Arabia.

[12]Pharmacist, Pharmaceutical Services Administration, King Abdullah Medical City, Makkah, kingdom of Saudi Arabia.

Abstract

Purpose: The primary goal of this review is to assess the impact of clinical pharmacists on cancer treatment outcomes, specifically focusing on patient quality of life, treatment adherence, and the reduction of adverse events. A secondary goal is to identify specific interventions or activities that have the most significant effects in cancer care settings.

Methods: Conduct a comprehensive search across databases include PubMed, Embase, Cochrane Library, and CINAHL. Use keywords like “clinical pharmacist in oncology,” “oncology pharmacist interventions,” “pharmacist role in cancer treatment,” and “patient outcomes in oncology.” This research will assist identify evidence-based approaches that improve oncology patient outcomes and advance a greater understanding of the critical role pharmacists play in cancer treatment.

Conclusion: Available evidence suggests that outpatient oncology practices may benefit from integrating pharmacists into care models in order to more effectively, efficiently, and holistically address the needs of patients with cancer.

Background

The complexity of oncology treatment, including chemotherapy, targeted therapies, and supportive care, requires specialized knowledge to ensure safe and effective patient care. Clinical pharmacists in oncology play an essential role in medication management, patient education, symptom management, and monitoring for adverse effects. This systematic review will examine the specific roles of clinical pharmacists in oncology settings and the impact of their interventions on patient outcomes, including treatment adherence, management of adverse effects, quality of life, and clinical outcomes.

Objectives

The primary objective of this review is to evaluate the impact of clinical pharmacists' interventions in oncology on patient outcomes, such as treatment adherence, adverse event reduction, and quality of life. A secondary objective is to identify specific activities or intervention types that demonstrate the most significant impact in oncology settings.

Research Questions

1. How do clinical pharmacists' interventions in oncology affect patient adherence to treatment regimens?

2. What is the impact of pharmacist-led interventions on the management of treatment-related adverse effects in cancer patients?

3. How does the involvement of clinical pharmacists in oncology influence patients' quality of life and satisfaction with care?

4. Are there specific pharmacist roles or intervention strategies in oncology associated with improved clinical outcomes?

Methodology

1. Literature Search: Conduct a comprehensive search across databases such as PubMed, Embase, Cochrane Library, and CINAHL. Use keywords like "clinical pharmacist in oncology," "oncology pharmacist interventions," "pharmacist role in cancer treatment," and "patient outcomes in oncology."

2. Inclusion Criteria:

- Studies focused on the involvement of clinical pharmacists in oncology.
- Interventions conducted in oncology settings, including hospitals, outpatient clinics, and specialized cancer centers.
- Studies reporting patient-centered outcomes such as treatment adherence, symptom management, quality of life, and clinical outcomes.

3. Exclusion Criteria:

- Studies not involving pharmacists as primary intervention providers.
- Studies focused solely on non-patient outcomes (e.g., cost analysis without clinical impact).

4. Data Extraction:

- Study characteristics: design, sample size, setting, type of cancer treated.
- Intervention details: type and frequency of pharmacist activities (e.g., medication management, counseling, adverse effect monitoring).
- Outcomes: patient adherence, adverse event rates, quality of life scores, overall survival, and patient satisfaction.

5. Quality Assessment: Evaluate study quality using tools such as the Cochrane Risk of Bias tool for RCTs and the Newcastle-Ottawa Scale for observational studies to ensure reliable and valid results.

6. Data Synthesis: Conduct a meta-analysis if feasible, particularly for adherence and adverse event management outcomes. Otherwise, use a narrative synthesis to summarize findings on the types of interventions and their effectiveness.

Expected Outcomes

This systematic review aims to provide insights into:

1. The impact of clinical pharmacist involvement on patient adherence and treatment continuity in oncology.

2. Effectiveness in managing chemotherapy-related adverse effects and improving patient quality of life.

3. Specific roles (e.g., counseling, medication adjustments, monitoring) that may optimize patient outcomes.

4. Areas where clinical pharmacists add significant value to the oncology care team, potentially guiding future research and clinical practice.

This review will contribute to a broader understanding of the essential role's pharmacists play in cancer care and help identify evidence-based practices that improve patient outcomes in oncology.

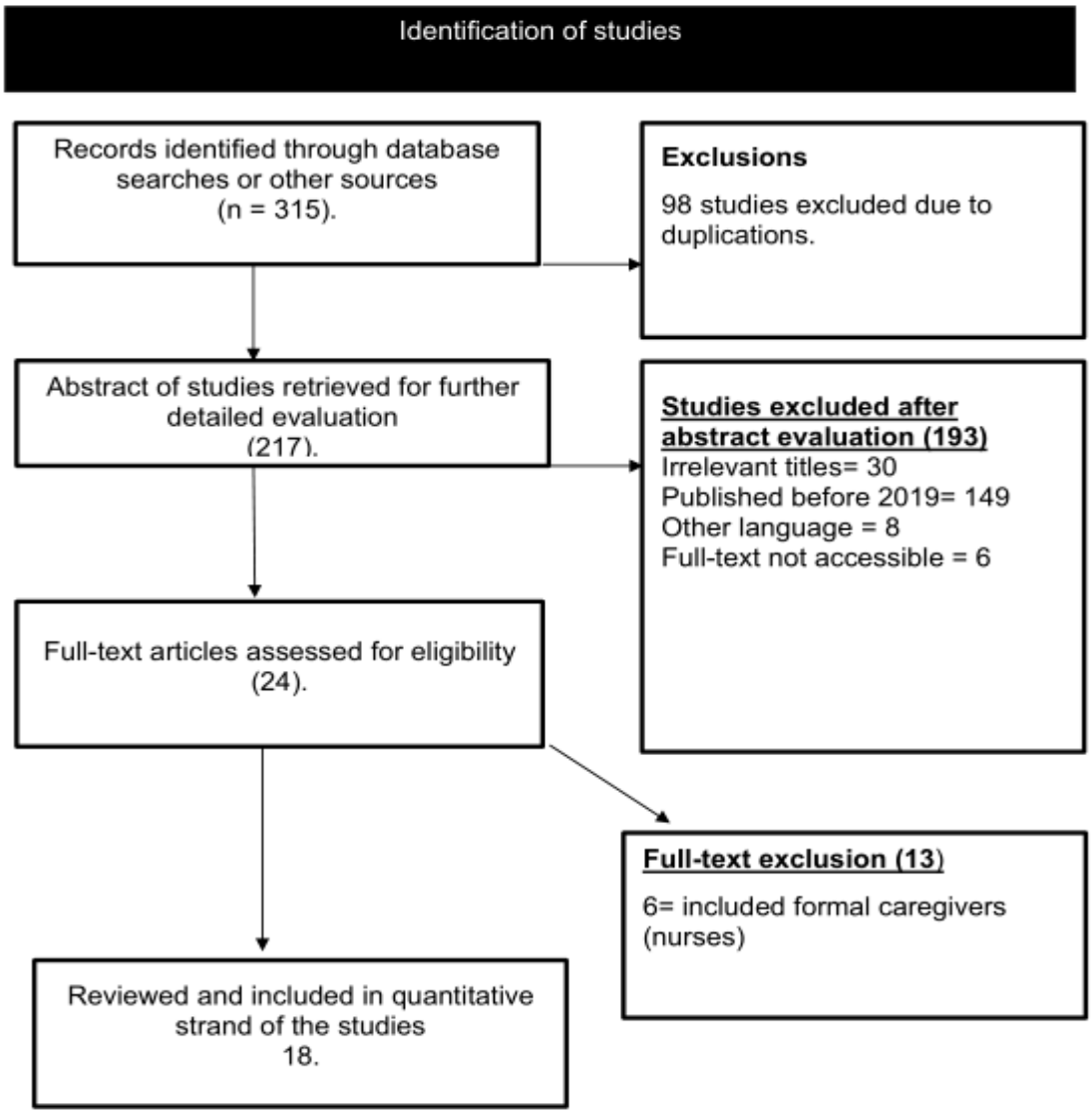

Figure 1. PRISMA flow diagram

Literature review

The field of clinical pharmacy is one that is always changing. In 1961, Charles Walton defined this term, which was first used in the United States in the 1960s, as "the optimal use of the pharmacist's judgment and pharmaceutical and biomedical knowledge, with the aim of improving the efficacy, safety, cost-effectiveness, and accuracy according to which drugs should be used in the treatment of patients." This definition illustrates how this practice can be used in a variety of ways, and the clinical pharmacy approach varies according on the

nation in which it is used. While some chemists can alter dosages, others still primarily restrict this activity to a pharmacological examination of the prescription. In 1962, a pharmacist at the University of Michigan reported one of the earliest clinical pharmacy operations. It was a drug information center at a university. As a result, the pharmacist participated in the process of making decisions for the best possible care (Sourisseau et al., 2023).

For clinical pharmacists, oncology is a particularly intriguing specialty. Numerous teams have developed clinical pharmacy operations in this field as a result of the chronic nature of some cancers, the variety of available treatments, and the fact that care is given in hospitals and at home. The evaluation of the discipline evolved along with it, resulting in a growing number of impact studies that have been published (Sourisseau et al., 2023).

The Oncology Pharmacist

One subspecialty of pharmacy practice is oncology pharmacy. This specialization combines sophisticated knowledge of the management and treatment of patients with cancer with the expertise and abilities of regular pharmacy practice. Because of their training and experience in oncology diseases and management, oncology pharmacists guarantee the safety and suitability of anticancer therapy for patients. A large number of oncology pharmacists work directly with patients or make clinical decisions as integrated members of the inpatient and ambulatory oncology teams. Oncology pharmacists, however, have been working in different capacities. It may be the responsibility of certain oncology pharmacists to supervise the sterile compounding of anticancer medications and guarantee that the customized regimen is suitable and secure for patients undergoing anticancer therapy. Other oncology pharmacists might work in specialist pharmacies that prescribe oral anticancer medications. Additionally, some pharmacists who specialize in oncology may work in informatics, investigational drug services, or practice management (Segal et al., 2019).

Traditionally, a pharmacist's primary responsibility was to provide drugs. However, by giving more direct patient care starting in the 1960s, pharmacists started to broaden their responsibilities. More recently, oral chemotherapy clinics run by oncology pharmacists have shown better clinical and financial results for cancer patients. Regular adherence checks, toxicity monitoring, and better patient access to medications are ways to achieve this. Pharmacologists who directly provide patient or population-based care by tailoring therapy based on tumor genetics may be included in other developing fields like precision medicine (e.g., pharmacogenomics). Depending on an institution's or healthcare system's pharmacy practice model, size, and context (e.g., academic, community), the specific role and key activities of the cancer pharmacist can change. Additionally, state and/or institution rules pertaining to credentialing, prescribing power, and collaborative practice agreements (CPAs) may affect the pharmacist's fundamental daily tasks (Muluneh et al., 2018).

In addition to their pharmacy school education, an increasing number of cancer pharmacists complete a two-year postgraduate residency program. To guarantee the specific clinical knowledge and expertise required to handle the complicated patients in the field of oncology pharmacy, residency programs in oncology pharmacy have certain competencies, goals, and objectives that must be fulfilled. In addition, a lot of cancer pharmacists hold board certification in oncology pharmacy (BCOP), which attests to a pharmacist's proficiency in oncology pharmacy and management (Weddle et al., 2020).

Because the person handling chemotherapy must be knowledgeable about drug interactions, handling, chemistry, microbiology, and other topics, including pharmacology, which only pharmacists possess, many countries and oncology centers only permit pharmacists with oncology specialization to handle chemotherapy. The new high complexity requirements have been incorporated into the modernization of the specialty and graduate courses. In addition to the fact that we cannot imagine another professional administering chemotherapy but an oncology nurse, and that an oncology physician would define the protocol and prescribe the chemotherapy, we also cannot imagine another professional handling chemotherapy these days but an oncology pharmacist (Schmidt, 2022).

The Roles of an Oncology Pharmacist

An essential part of the multidisciplinary healthcare team, the Oncology Pharmacy Team is made up of pharmacists with specialized training and their

group of pharmacy technicians. This team, which is involved in every facet of cancer patient care, strives to ensure safety, excellent patient care, and compliance with local regulations. In order to involve this team, the International Society of Oncology Pharmacy Practitioners (ISOPP) created a statement that serves as a guide for five important areas: contributions to patient care, management of oncology pharmacy practice, education and training, and oncology research and quality initiatives. According to their position statement, in order to maximize patient care, the oncology pharmacy team should be fully integrated into the multidisciplinary team. Healthcare and educational institutions should also create programs to continuously educate the team members, and regulatory bodies should create certification programs to acknowledge the special contributions made by the oncology pharmacy team in the treatment of cancer patients (Holle et al., 2021).

Figure 2. Clinical pharmacists role.

It is the duty of an oncology pharmacist to assess the prescriptions and procedures to determine whether they are suitable for the patient. They must also assess the dosages, drug interactions, volume, and chemical compatibility. If the patient's needs are not met, they must get in touch with the doctor who prescribed the medication to propose modifications, politely explain the rationale and mechanisms, and collaborate for the patient's benefit. Before phoning the doctor, the pharmacist should know exactly what he needs to talk about, be receptive to criticism, and examine the procedure as a team for the patient (Holle et al., 2021).

Since the pharmacist shares responsibility for all medications the patient receives, it is the pharmacist's responsibility to discuss the therapy with the doctor as much as is required or to get in touch with a preceptor or the rest of the team if the therapy is harmful and the doctor is unable to spot a mistake. A pharmacist should assess whether he can help improve the therapy for that patient while also determining whether the therapy, including pre-chemotherapy and support medications, is appropriate. A more focused approach to the procedure may be necessary if the patient has a volume constraint. Because there will be fewer drug interactions, the patient might benefit from taking another combination of support medications. Perhaps that patient would benefit more from a different formula. Should there be opportunities to enhance the treatment, the pharmacist ought to contact the prescribing doctor to recommend that (Kaya et al., 2021).

Optimizing the patient's adherence to anticancer therapy and the many formulas and support medications that can aid in this should be the pharmacist's goal. A clinical pharmacist can keep an eye on pharmacovigilance-related activities and the side effects of medication therapy. It's also crucial to confirm, go over, and suggest methods for dealing with food and medication issues both before and throughout treatment. Make sure supportive care is planned and carried out, and handle treatment-related side effects according to the patient. Along with the rest of the team, a pharmacist's responsibility is to support patient and caregiver advocacy (Kaya et al., 2021).

An oncology pharmacist's responsibilities also include team training and the establishment of safe practice guidelines and standards. Medication errors, drug-related issues, and drug-related morbidity should all be minimized, managed, and prevented by the oncology pharmacist. All team members should write and study standard operating procedures (SOPs), which are essential. To ensure a safe practice, it is crucial to periodically reread the SOPs and complete fresh training. In addition to encouraging proper pharmaceutical handling, storage, and dispensing, the cancer pharmacist must ensure the quality of the medications. The atmosphere and medications should be kept sanitary, with bacteria and temperature under control (Moukafih et al., 2020).

The pharmacist must be able to think critically, validate the methods and sources employed, and update them in light of scientific advancements. A excellent oncology pharmacist is ahead of the curve; they don't only adhere to the law and the bare minimum. A competent cancer pharmacist is resourceful, flexible, and able to make the most out of the least amount of resources (Moukafih et al., 2020).

Education and training for the pharmacist

The pharmacist must receive education and training, and they must also spread information among their coworkers, the multidisciplinary team, and the patients. Good pharmacists are lifelong learners and teachers. Furthermore, they have the humility to realize that their actions are always done for the benefit of the patient's health as well as the community's overall health. They are resilient enough, nevertheless, to resist being duped by misinformation or to put up with circumstances that could endanger their own health or the health of their patients. The most important thing is that they and their teams stay safe. You must look for yourself before you can look after others (Oliveira et al., 2020).

Clinical care

A wide range of pharmacist clinical care treatments have been described in numerous research. Patient outcomes, laboratory monitoring for supportive care management, and more documentation in the electronic medical record (EMR) have all been demonstrated to be directly impacted by these treatments. A collaborative physician-pharmacist-managed myeloma clinic, for instance, dramatically increased adherence to supportive care medications, venous thromboembolism prophylaxis, and reduced the number and length of delays to receiving immunomodulatory treatment, as demonstrated recently by Sweiss and colleagues. Furthermore, a large number of published research have confirmed the effectiveness of pharmacist treatments. Studies usually use recognized categories of medication-related problems (MRP) to measure pharmacist treatments (Oliveira et al., 2020).

recognizing and addressing incorrect drugs, untreated indications, improper administrations, subtherapeutic dose, drug interactions, lack of monitoring, overdosing, administration omissions, and recognizing side effects are some examples of interventions that fall under the following MRP. Research indicates that including a pharmacist can lead to a 95% prescriber acceptability rate for the pharmacists' actions. Because of the complicated patient group, oncology treatments are linked to a high rate of prescription mistakes.17, 18, 48, and 63 Medication mistakes in cancer care settings are decreased or avoided by pharmacists. For instance, Chung and colleagues' study assessed the perceived benefits of include a pharmacist in an inpatient community hospital's interprofessional cancer care team (Oliveira et al., 2020).

Numerous studies have demonstrated the importance of oncology pharmacists in the treatment of cancer patients and in the oncology care team. In the areas of laboratory monitoring, supportive care management, clinical treatment that has a direct influence on patient outcomes, and more documentation in the electronic medical record,

oncology pharmacists have proven their worth. Most cancer pharmacist professions include patient education, which has been linked to high patient satisfaction rates, better learning outcomes, enhanced medication adherence, and disease-based outcomes (Whitman et al., 2018).

It has been demonstrated that the crucial role that oncology pharmacists play in informatics teams is linked to higher rates of medication mistake detection. Numerous studies have documented pharmacist-driven cost reductions, such as those that use pharmacists to administer oral anticancer medicines by delivering efficient ambulatory and inpatient care and putting quality improvement initiatives into place. Lastly, by creating autonomous practice models and handling duties normally performed by doctors, pharmacists can reduce the amount of time spent by doctors and advanced practice providers (APPs) (Knapp & Ignoffo, 2020).

Clinical pharmacy services in cancer pain management

An all-encompassing, multidisciplinary strategy that addresses important aspects of patient care is required for effective cancer pain treatment. The quality of cancer pain treatment is significantly improved by clinical pharmacy services. They provide specific expertise in patient education, drug management, ADR monitoring, and other areas. Every factor highlights the critical role clinical pharmacists play in improving patient outcomes, managing pain, and ultimately improving the quality of life for cancer patients (Shrestha et al., 2023).

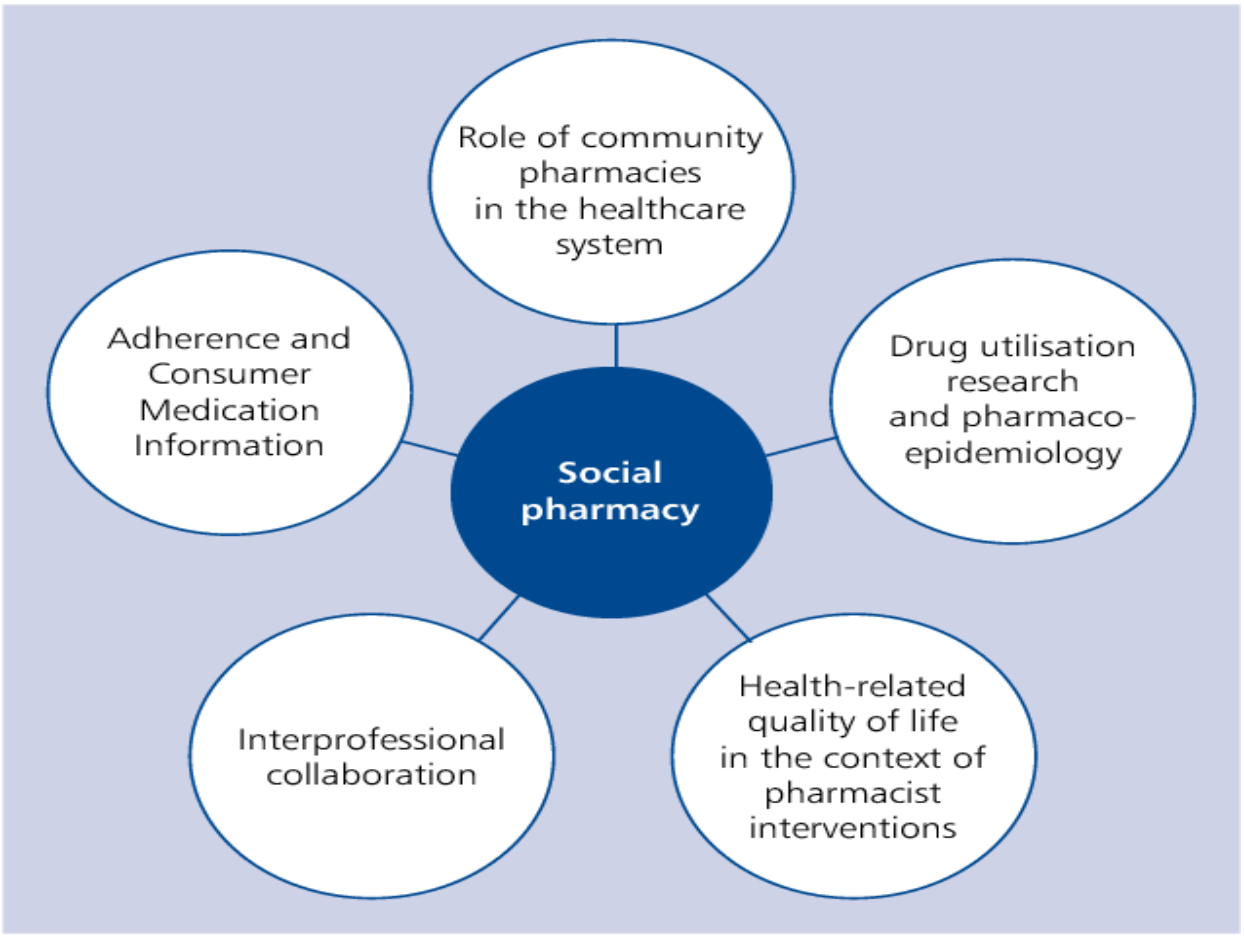

Figure 3. Role of social pharmacy

1- Patient history

To determine the causes, severity, frequency, and reaction to prior treatments of pain, a patient's medical history is essential. To develop a customized, safe pain management strategy that meets each patient's needs, clinical pharmacists require a thorough patient history. A patient's vocal or facial cues, cancer-related information, sociodemographic information, past treatment experiences, average pain rating over the previous week, current pain rating, treatment adherence history, and preferences for pain treatment should all be taken into account when collecting their medical history (Corli et al., 2019).

2- Medication review and dosing adjustments

Making ensuring cancer patients receive the right drugs and doses for efficient pain management is crucial, and medication reviews are one of the most important aspects of pharmaceutical treatment. Clinical pharmacists assist patients manage their pain and attain the best possible health results by keeping an eye on prescription regimens and modifying dosages. Additionally, they can help in recognizing and controlling side effects and medication interactions (Corli et al., 2019).

3- Adverse drug reactions (ADRs) monitoring

ADR monitoring is another essential component of clinical pharmacy services. Clinical pharmacists can assist in monitoring side effects, such as constipation, sedation, dizziness, nausea, vomiting, physical dependence, tolerance, and respiratory depression, that may arise from cancer treatments, including painkillers like opioids. They can also teach patients how to report side effects if they do occur. Clinical pharmacists can also assist in managing and avoiding future effects (Ramasubbu et al., 2020).

4- Drug interactions

One of the main concerns for cancer patients is drug-drug interactions (DDIs). DDIs may be a factor in opioid addiction, misuse, overuse, morbidity, and death.45 Working with other members of the healthcare team, clinical pharmacists can assist in identifying possible medication interactions and reducing the risks associated with them (Ramasubbu et al., 2020).

5-Physical examination

A physical examination yields important information and is essential for managing cancer discomfort. Pharmacists can evaluate a patient's posture, movement, and gait and watch for indications of discomfort or pain, such as eye closure or grimacing (Ramasubbu et al., 2020).

6- Pain scale assessment

Finding the right analgesic dosage is made possible by evaluating pain using a pain scale, such as the Brief Pain Inventory (BPI), a category scale or visual analog scale (no pain, mild pain, moderate pain, or severe pain), or a Numerical Rating Scale (NRS) with a range of 0 (no pain) to 10 (worst agony conceivable). In order to create an effective analgesic medicine regimen, pharmacists are essential in actively listening to patients and obtaining information (Bain & Knowlton, 2019).

7- Patient education and counseling

Comprehensive cancer pain management requires patient education and counseling. Pharmacists can assist dispel myths, reduce worry and panic, and improve adherence to recommended analgesic regimes by educating patients about their disease, available therapies, and expected effects.49 In order to provide emotional support and education to patients and their family caregivers, pharmacists can also provide instructional materials (such as pamphlets). (Bain & Knowlton, 2019).

8- Support to the team

Based on the patient's reaction to prior therapies, any contraindications, and underlying medical issues, the pharmacist can help treating physicians or medical oncologists choose the best course of action. Additionally, the pharmacist can help nurses and other medical personnel (Bain & Knowlton, 2019).

For a thorough and all-encompassing strategy to controlling cancer pain, clinical pharmacy services are essential. Clinical pharmacists are essential because they provide comprehensive patient evaluations, go over prescriptions, and provide patient education. They address pain triggers, improve drug programs, prevent ADRs, and uncover

probable interactions. Clinical pharmacists play a crucial role in alleviating cancer patients' suffering and enhancing their quality of life by working together in interdisciplinary teams. This is a major advancement in all-encompassing cancer treatment (Shrestha et al., 2023).

Promote patient and caregiver advocacy

In the healthcare system, the Oncology Pharmacy Team (OPT) is in a prime position to advocate for patients and caregivers and bring the public's and patients' concerns about cancer to the attention of decision-makers. Prioritizing patient needs and advancing the profession puts the OPT in a unique position to maximize their abilities as health care providers, from grassroots levels to global change. In order to meet the needs and concerns of individuals with cancer and eventually accelerate progress against the disease, patient advocates and medical experts from all fields have a shared objective. In order to address the growing cancer burden on the world's aging population and to raise knowledge of cancer prevention, incidence, patient treatment, and outcomes, advocacy is crucial. The OPT plays a part in advocating for patients both domestically and internationally (Hijazi et al., 2020).

In order to improve patient care, the OPT should collaborate with other fields in the following ways: 1-acting as a point of contact for the patient and family to get pharmaceuticals that are either too expensive or have limited distribution systems.

2. Working together and/or spearheading educational initiatives that promote cancer screening and prevention.

3. Progressing the study of cancer.

4. Dealing with regulatory and legislative issues.

5. Educating the people about cancer and how to handle it.

6. Offering assistance to people who are coping with cancer.

7. Evaluating the quality and worth of cancer treatment.

Treatment adherence and education for Self-Care

The establishment of a clinical pharmacy service in onco-hematology clinics has helped to encourage self-care education and treatment adherence. Promoting therapeutic adherence and educating patients on the risks, symptoms, and indicators of thrombosis, as well as how to use therapeutic medicines and avoid and manage anticipated adverse reactions, were the main goals of counseling (Oliveira et al., 2020).

An oncology pharmacist's influence goes beyond the care of a single patient; by actions like creating and enforcing medication safety regulations and policies, they can also have an indirect impact on patient outcomes. According to the literature reviewed here, the introduction of a clinical pharmacy service in oncology care units reduced the number of hospitalizations, treatment expenses, and adverse effects on patients' lives and health. It also helped to reduce errors resulting from incorrect prescriptions, drug interactions, and side effects. Additionally, via the practice of pharmaceutical care, the relationship and trust between pharmacists and patients receiving onco-hematology treatment were strengthened, improving the patients' quality of life. As a result, it made it feasible to improve patient satisfaction, treatment compliance, and ongoing professional advice on how to take antineoplastic medications as directed, as well as manage side effects and potential interactions. (Maleki et al., 2018).

The majority of the research included in this evaluation, which was carried out in a variety of settings and circumstances, came to the conclusion that clinical pharmacy services helped with the customization and tracking of treatment plans. By cutting down on needless spending and hospital stays, it also benefited the patient and the health system by assisting in the accomplishment of the multiprofessional team's objectives. The monitoring and assessment of drug interactions between chemotherapeutic treatments and the use of complementary and alternative therapies, such teas and herbal medications, was another pertinent service that pharmacists created (Passey et al., 2020).

Conclusion

The actions of pharmacists in outpatient cancer clinics have been documented in earlier research. In order to enhance and expedite patient care, this study demonstrated a greater quantity and variety of clinical pharmacist activities in outpatient cancer clinics with embedded pharmacists. Pharmacists have been demonstrated to be highly esteemed members of the therapeutic team. In order to give data to support the participation of cancer pharmacists in ambulatory clinics, future initiatives may involve doing prospective, controlled studies that connect the pharmacists' activities to observable results.

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