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Working mode of oncology surgical pharmacy in China

Modelo de trabajo de la farmacia quirúrgica oncológica en China

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Abstract

Surgery plays an irreplaceable role in the prevention, diagnosis, staging, reconstruction, and rehabilitation in the overall management of cancer. Nevertheless, it is difficult for surgeons and nurses to take into account the details of medication management, considering the impact of surgery on the patient's physical function and the complexity of anti-tumor treatment with comorbidity. The pharmaceutical care services previously provided by pharmacists in oncology focus more on the internal medicine system, not widely the surgical field. At present, the pharmaceutical working mode in oncology surgery has not well been formed around China, and the whole process medication management needs to be improved. In 2015, the GuangDong Pharmaceutical Association came up with the concept of surgical pharmacist in China and subsequently created its position. In 2021, the GuangDong Pharmaceutical Association established a new discipline termed "surgical pharmacy", which is the knowledge system of surgical pharmacists, and also tried to differentiate surgical pharmacy into diverse areas, such as oncology surgical pharmacy. This article introduced a working mode of surgical pharmacists in China that providing pharmaceutical care services in perioperative period around anti-tumor, anti-infection, anesthesia, anticoagulation, blood pressure, blood glucose, nutrition, and pain management, to improve quality of life for patients.

Resumen

La cirugía desempeña un papel insustituible en la prevención, diagnóstico, estadificación, reconstrucción y rehabilitación en el tratamiento global del cáncer. Sin embargo, es difícil que cirujanos y personal de enfermería tengan en cuenta todos los aspectos de la gestión de la medicación, como el impacto de la cirugía en la función física del paciente y la complejidad del tratamiento antitumoral con sus comorbilidades. Los servicios de atención farmacéutica que anteriormente prestaban los farmacéuticos en oncología se centraban más en aspectos de la medicina interna, y no ampliamente en el ámbito quirúrgico. En la actualidad, el modo de trabajo farmacéutico en la cirugía oncológica aún no está definido en China, y existe una necesidad de mejorar la gestión de la medicación de todo el proceso asistencial. En 2015, la Asociación Farmacéutica de GuangDong propuso la creación del rol de farmacéutico quirúrgico en China y posteriormente creó su puesto de trabajo. En 2021, la Asociación Farmacéutica de GuangDong estableció una nueva disciplina denominada "farmacia quirúrgica", que es el área de conocimiento de los farmacéuticos quirúrgicos, y también intentó diferenciar la farmacia quirúrgica en distintas subáreas, como la farmacia quirúrgica oncológica. Este artículo presenta el modo de trabajo de los farmacéuticos quirúrgicos en China, que proporciona servicios de atención farmacéutica en el periodo perioperatorio de los pacientes incorporando los distintos aspectos del tratamiento antitumoral, control de infecciones, anestesia, anticoagulación, control de la presión arterial y la glucosa en sangre, nutrición y tratamiento del dolor, con el objetivo de mejorar la calidad de vida de los pacientes.

KEYWORDS
Oncology surgical pharmacy; Perioperative period; Medication therapy management.

PALABRAS CLAVE
Farmacia quirúrgica oncológica; Periodo perioperatorio; Gestión del medicamento.

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Introduction

Surgical oncology is a complicated diagnosis and treatment system, which includes surgical removal of primary tumors and metastatic sites, and potential surgical emergencies, such as obstruction and perforation of the gastrointestinal tract, bleeding, infections, and pathological fractures[1]. Specifically, medication-related problems (MRPs) need to be considered in oncology surgery, including adverse drug reactions, medication errors, drug-drug interactions, and medication overuse or omission[2]. Therefore, a thorough evaluation for MRPs is necessary[2], including neoadjuvant and adjuvant therapy, concurrent chemoradiotherapy, perioperative infection control, rehabilitation, chronic diseases, multiple-course antitumor drugs-induced complications, and use of traditional Chinese medicine (TCM) and supplements[3].

As a member of multi-disciplinary team (MDT), clinical pharmacists play an important role in comprehensive medication therapy management and reduce rates of adverse effects[4]. Previous literature showed that the number of MRP after pharmacist-led medication assessment and planning intervention was much reduced[2,4,5]. In 2015, the GuangDong Pharmaceutical Association (GDPA) came up with the concept of surgical pharmacist in China and subsequently created its position[6,7]. In 2021, the GDPA established a new discipline termed "surgical pharmacy", which is the knowledge system of surgical pharmacists[8,9]. Because of the stress reaction and anesthesia, the same clinical conditions may be managed differently for different therapeutic goals in surgery and internal medicine. For example, hyperglycemia in perioperative period may result from stress reaction or (and) anesthesia instead of diabetes. Incipient hyperglycemia may be treated with oral hypoglycemic drugs in endocrinology departments, while insulin is the first choice to control perioperative hyperglycemia. Furthermore, some drugs are used differently between in surgery and in internal medicine. For example, glucocorticoids are widely used in surgery for anti-stress reactions, such as pain, postoperative nausea and vomiting (PONV), airway responses, and inflammation, which many physicians are not familiar with. That's why we believe that surgical pharmacy is a discipline[8,9]. Then we tried to differentiate surgical pharmacy into diverse areas, such as oncology surgical pharmacy[3]. Surgical pharmacists are responsible for whole process medication therapy management during the perioperative period, improving prevention and management of MRPs, and contributing to rational use of drugs.

For this article, we outline a working mode of oncology surgical pharmacy in China that surgical pharmacists, as a bridge between surgeons and physicians, improve medication therapy management, provide whole-course pharmaceutical care, decrease the rates of MRPs, and improve the quality of life for patients.

Working mode of oncology surgical pharmacy

Work characteristics

Surgical pharmacists should be familiar with the working characteristics of the surgical department. (1) Disease characteristics (tumor location, staging, pathological and molecular diagnosis, and oncologic emergencies). (2) Patient characteristics (age, liver and kidney damage, comorbidities such as pleural effusion and ascites, poor physical condition, multi-course treatments, and multiple departments). (3) Treatment characteristics (radical surgery, elective surgery, emergency surgery, comorbidity treatment, and infection management). (4) Medication treatment (drug selection, combination medication, medication route, dose adjustment, drug-drug interaction, and adverse reactions). Based on clinical evidence, surgical pharmacists provide perioperative medication management of stress, anti-infection, anesthesia, pain, blood sugar, thrombosis, PONV, nutrition, and blood pressure, by professional knowledge of pharmacotherapeutics and pharmacokinetics.

Treatment path

Focusing on the whole process perioperative management of surgical oncology patients, surgical pharmacists take the following steps for treatment path management.

Before surgery: (1) Obtain complete medical history from patients. Comprehensively sort out the preoperative medication, especially multi-course treatments and chemotherapy with limited cumulative doses. Record all prescription and non-prescription drugs, TCM, and health care products. (2) Develop an individualized treatment plan. Based on the drug list, surgical plan and pathophysiology should be discussed in MDT meetings, with emphasis on contraindications and precautions.

During surgery: (1) Antibiotics standardized use. (2) Pay attention to drug-drug interaction, drug compatibility, and adverse reactions. Focus on rational use of sedatives, narcotics, antiemetic drugs, and airway management. (3) Review surgical records, MRPs, and postoperative orders, and timely adjust the treatment plan based on comorbidity and relevant indicators.

After surgery: (1) Re-evaluate the patient cases, including postoperative pain, nausea, vomiting, postoperative nutrition, thrombosis prevention, and hemodynamic evaluation. (2) Analyze the efficacy, safety and compliance of perioperative drugs, and actively carry out therapeutic drug monitoring when necessary. (3) Conciliation medication usage after patients return to the ward whose physiological and biochemical indexes tend to be stable.

The whole process of therapeutic education to patients: (1) During perioperative period, therapeutic education includes perioperative pain management, nutritional support, nausea and vomiting caused by operation, venous thrombosis, and blood glucose changes. (2) During period of treatment at home, surgical pharmacists provide education about nutritional support, exercise and rehabilitation mode, as well as drug storage.

Follow-up: (1) Make a highly operable follow-up plan. (2) Establish exclusive follow-up management files for patients, update and manage them dynamically. (3) Follow-up can be carried out by a variety of methods, including telephone, home visits, short messages, and apps like WeChat, to ensure the continuity and integrity of information[10]. (4) Pay attention to the new MRPs in each follow-up, and intervene in time to avoid serious adverse reactions.

Pharmacy service: provide pharmaceutical care after surgical treatment, including rational use of antitumor drugs, adverse reaction management, long-term management of cancer pain, blood pressure, blood glucose, and postoperative nutrition, etc.

Key points of medication management in surgical oncology

Anti-infective medications

Infection is a common cause of death in patients with cancer[11]. As cancer patients frequently receive surgery, radiotherapy, chemotherapy, and immunosuppressive therapy, they are more susceptible to infection because of reduced immune function. (1) For preventive use of anti-infective drugs, surgical pharmacists should take surgical incision types and risk factors into consideration. (2) For therapeutic use of anti-infective drugs, surgical pharmacists should clarify clinical indications and pathogens, then select antibiotics with high curative effect and low toxicity according to antibacterial activity, pharmacokinetic characteristics, adverse reactions, and cost.

Anesthesia-related medications

Anesthetics reduce anxiety, maintain intraoperative hemodynamic stability, and reduce postoperative adverse reactions. Non-steroidal anti-inflammatory drugs have analgesic effects and act by inhibiting cyclooxygenase[12]. Etomidate enhances the inhibition of the neurotransmitter γ-aminobutyric acid and has stable cardiorespiratory profile and no cardiovascular or respiratory depression[13]. As an intravenous hypnotic drug, propofol acts through the potentiation of the inhibitory neurotransmitter γ-aminobutyric acid[13]. Surgical pharmacists should be familiar with the pharmacology, pharmacokinetics, and pharmacotherapeutics of anesthesia-related drugs, to provide medication suggestions for drug selection and dosage adjustment.

Pain management

Cancer patients often have persistent pain in perioperative period, which causes inflammation, hypothalamic pituitary axis activation, and sympathetic system overreaction, leading to immunosuppression. Surgical pharmacists participate in the comprehensive pain management, by performing preoperative evaluation, discussing in MDT meetings, and continuously monitoring analgesic effect, to prevent the transformation of acute pain to chronic pain, to help patients receive the best supportive care, and to reduce rates of adverse reactions.

Blood glucose management

It's more difficult to make blood glucose management in cancer patients with diabetes. Multiple factors may contribute to the progression of cancer in obesity and type 2 diabetes, leading to poor healing and infection[14]. Surgical pharmacists should pay attention to blood glucose management by the following steps: (1) Evaluate the impact of previous antitumor treatment and high-risk factors on blood glucose before operation. Evaluate the potential risk patients will have and stratify them. (2) Multi-point blood glucose monitoring is recommended for all patients in perioperative period. (3) Keep blood glucose monitoring after operation. Diet control, oral hypoglycemic drugs, insulin, and nutritional support are used to control blood glucose.

Prevention and treatment of venous thromboembolism

Venous thromboembolism (VTE), which is divided into deep-vein thrombosis and pulmonary embolism, is one of the important causes of mortality among cancer patients[15]. (1) Surgical pharmacists should actively discuss about VTE prevention and treatment in the MDT meeting, participate in the development of VTE management, and conduct risk assessment of VTE and bleeding for patients. (2) Surgical pharmacists provide the whole process of monitoring services throughout admission, transition to the hospitalization unit and discharge, take timely appropriate preventive intervention according to VTE risk factors, and adjust treatment strategies based on the results of assessment to reduce or avoid the occurrence of nosocomial VTE and the rate of mortality and disability. (3) For the treatment of VTE, the thrombus site and area and contraindications to anticoagulation need to be taken into account. (4) Pharmacologic therapies in anticoagulation are the core treatment, and the risk of thrombosis and bleeding should be balanced to make reasonable individualized treatment.

Management of nausea and vomiting

PONV affect recovery, even lead to dehydration, electrolyte imbalance, and wound dehiscence. Important risk factors for postoperative nausea and vomiting include female, no history of smoking, history of nausea and vomiting after surgery, history of motion sickness, age < 50 years, and obesity. 5-hydroxy tryptamine 3 receptor antagonists, neurokinin type-1 receptor antagonists, corticosteroids, phenothiazines, and anticholinergics are drugs commonly used. Surgical pharmacists can provide lifestyle and diet adjustment education for patients with high-risk factors. For patients taking multiple drugs in combination, therapeutic drug monitoring should be performed at the same time, with attention to adverse reactions. For example, corticosteroids can lead to postoperative blood glucose changes, delayed wound healing, and the increased risk of infection[16].

Nutrition management

Malnutrition is common in cancer patients, related to lower performance status, lower response to treatment, and increased treatment-related toxicity[17]. Surgical pharmacists can carry out whole-process nutrition management for patients according to the following process. (1) Preoperative nutritional screening, including tumor assessment, eating ability, important organ function assessment, energy consumption level, stress level, inflammatory indicators, metabolic status, as well as psychological status and physical activity assessment. (2) Perioperative nutritional support. The daily energy requirements for patients in the perioperative window are 25 to 30 kcals/kg/day[18]. Based on clinical manifestations of patients, parenteral or enteral nutrition is recommended. (3) Follow-up evaluation of nutritional intervention and patient education on daily diet is conducted after surgery.

Blood pressure management

Some anticancer agents are closely associated with hypertension[19], which are mainly divided into two categories: vascular endothelial growth factor (VEGF) signaling pathway inhibitors that reduce effective capillary beds by reducing nitric oxide production and increasing endothelin-1 production[20,21]; some monoclonal antibodies targeting the epidermal growth factor receptor[21]. Surgical pharmacists can provide blood pressure management for patients: (1) Comprehensive evaluation before surgery about history of hypertension, blood pressure, medication, and especially the effect of previous anti-tumor therapy on blood pressure. (2) Abnormal blood pressure is mainly manifested as elevated preoperative blood pressure, hypertension during induction of anesthesia or at the end of surgery, hypotension at the late stage of anesthesia induction, unstable intraoperative blood pressure, and postoperative hypertension. Choose appropriate drugs to control blood pressure according to clinical practice. (3) Strict monitoring of blood pressure and timely treatment should be performed after surgery.

Integration of oncology surgery medication

At present, the practice of integration of medication in surgical oncology is still being continuously explored. Throughout the entire diagnosis and treatment process (before hospitalization, before surgery, during surgery, after surgery, and after discharge), pharmacists-led medication integration is conducive to a more comprehensive understanding of medication use. Surgical pharmacists take the following steps for medication integration. (1) Obtain the complete medication history, especially of the patients who take multiple drugs due to chronic diseases. (2) Evaluate whether the long-term medications are still suitable in the perioperative period. Use of short-term perioperative medications should include careful consideration of patient's surgical characteristics, tumor characteristics, preoperative physical status, medication history, and especially drug-drug interaction. (3) Actively conduct therapeutic drug monitoring, and monitoring of efficacy and adverse events after surgery.

Conclusion

We outline a working mode of oncology surgical pharmacy in China based on clinical practice. Based on typical characteristics of cancer patients, such as special pathophysiology, complexity of surgery, and diversity of therapeutic drugs, oncology surgical pharmacists provide pharmacy services throughout the whole process, including pharmaceutical evaluation, integration of medication, review of prescription, medication monitoring, efficacy and safety evaluation, medication education, and follow-up. As a link between surgeons and internal medicine physicians, surgical pharmacists play a role in medication management of anti-tumor treatment, anti-infection, antithrombotic therapy, antiemetic and analgesic therapy, as well as nutrition, providing patients with cross-grid and full-process pharmaceutical care services. On the basis of this preliminary exploration, oncology surgical pharmacists continue to summarize clinical and pharmacy data, further optimize the theoretical framework with the help of evidence-based medicine, pharmacoeconomic evaluation and other tools.

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Conflicts of interest

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