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Methodology for Training the Resident of General Surgery in the Comprehensive Care to the Patient with Colon Cancer

Zenén Rodríguez Fernández[1], Arlines Wilson Mustelier[2], Erick Manuel Milán Dinza[2], Benjamín Deulofeu Betancourt[1]

1. Saturnino Lora Teaching Clinical Surgical Provincial Hospital, Cuba.
2. Dr. Juan Bruno Zayas Alfonso Teaching General Hospital, Cuba.
*Corresponding author.
Email address: rodriguezfernandezzenen@gmail.com

Abstract: Introduction: The general surgery specialization programme covers the subject of colon cancer within the coloproctology specialization during the second year of training. However, due to its short duration of only one month, it is completely inadequate to cover all the necessary theoretical and practical aspects of the subject. Therefore, a methodology is proposed for the training of the general surgery resident in the comprehensive care of the colon cancer patient, for which the theoretical methods of analysis and synthesis, systematization and generalization of experiences, as well as the systemic structural functional and holistic dialectical methods were applied. Development: The formative intentionality of the curriculum contradicts the didactic principle of higher education, which require a systematic, comprehensive and general approach. The curriculum itself lacks adequate epistemological and methodological systematization, which is apparent from the fragmentation, lack of coherence and flexibility for its application in various surgical training contexts. The extensive fragmentation of the curriculum through systematic formative processes does not stimulate the pedagogical approach required to achieve the stipulated objectives for this program. Conclusions: This proposal divides the theoretical and practical content of colon cancer issues into specific content. Throughout the professionalization process of general surgery, the level of complexity continues to increase, and activities related to education at work are effectively carried out together. This may contribute to the training of this professional in the comprehensive care of patients with colon cancer.

Key words: methodology; curriculum; internship and residence; general surgery; colon cancer

1. Introduction

In the present century, colon cancer is recognized worldwide as the most common malignant tumor of the gastrointestinal tract in people over the age of 60 of both sexes. Approximately 75% of people with colorectal cancer have no personal or family history of the disease. [1]

As with other malignant diseases, the etiopathogenesis of colon cancer is also unknown. In general, it is thought to be heterogeneous, and the environmental and genetic factors related to its occurrence have been described. These differences indicate that its causality varies according to geographical area, and that the induction of risk factors differs in both sexes

and in successive generations, in correspondence with lifestyles and environmental, social or cultural conditions. [2]

Colon cancer has been registered as the second cause of cancer death for both sexes in developed countries, in men after lung and prostate cancer and in women after breast cancer. It should be noted that early detection can lead to cure in 80 to 90% of cases. [1]

Epidemiological analysis of mortality from this type of cancer in Cuba in recent years reveals a significant increase. In 2015, 2,319 deaths were quantified (20.7 deaths per 100,000 inhabitants); in 2018, 2,412 were reported (21.4 per 100,000 inhabitants); in 2019, 2,386 were recorded (21.3 per 100,000 inhabitants) and in 2020, 2,548 died, for a rate of 22.7 per 100,000 inhabitants. [3]

In this sense, early surgical intervention is the cornerstone of successful treatment for patients with colon cancer, and it is the responsibility of general surgeons in Cuba to perform most of these operations. Therefore, the importance of acquiring knowledge about the care of these patients during the training process of general surgical resident physicians, where epistemological and practical limitations are the foundation of this process and are manifested in this process.

This affirmation is supported by the authors' experiences of the present research during more than two decades in the assistance, teaching, research and administrative practice of the specialty and in the section for the development of colon surgery in the general surgery services of the Saturnino Lora Teaching Clinical Surgical Provincial Hospital and Dr. Juan Bruno Zayas Alfonso Teaching General Hospital of Cuba.

A particular analysis of the General Surgery Specialty Program shows that the content of colon and rectal cancer corresponds to the rotation for the specialty of coloproctology during the second year. According to the 1986 Program, the initial three-month period of this major has been reduced to one month in the Program that have been in effect since 2015 [4]. Time is considered insufficient to cover all necessary theoretical and practical content.

All of the above arguments were the basis for this study, which proposes a methodology for the training of general surgery residents in the comprehensive care of patients with colon cancer during the four years of specialization.

In order to achieve this purpose, the following theoretical methods were employed:

- Analysis and synthesis in the review of documents related to the training process of professionals and those related to the scientific knowledge of the profession.
- The systematization and generalization of experience, the development of abstraction and generalization, which are concretized in the conception of the methodology.
- Systemic structural functional in the elaboration of the methodology from a logical perspective.
- Holistic dialectical, to establish the dialectical contradictions emerging from the principles of higher education didactics.

2. Development

The Ministry of Higher Education of the Republic of Cuba has implemented the "Postgraduate Education Regulations" through Resolution No. 140 of 2019, [5] which stipulates that "the specialty is a postgraduate training process provided for university graduates, deepening or expanding their knowledge in specific fields of a wide range of professions". This study includes postgraduate training for general surgical experts, which is a unique aspect of the medical sciences.

The concept of education at work is the basis of the training process of undergraduate students and residents during the period of specialization in medical sciences. It was developed in Cuba by the eminent clinician and professor Fidel Enrique Ilizástigui Dupuy (1924-2005), who defined it as the guiding principle of Cuban medical education [6] and formed spatio-temporal organization of the teaching and learning process in medical sciences. It has been classified as a teaching

method in the didactic category, since its fundamental objective is to acquire the modes of professional performance in the real scenarios where the student and the resident will develop their professional activities after graduation. [7]

These characteristics make education at work go beyond the simple relationship between theory and practice and study and work, because it also articulates the dialectic unity of instruction and education, so that the learner acquires not only the necessary knowledge, habits and skills, but also the values that will accompany him/her in the exercise of his/her professional life for the rest of his/her life. [8]

The daily healthcare activities: medical on-call, on-call delivery, visiting pass, medical discharge meeting, case presentation and diagnostic discussion, specialized outpatient consultation and in the healthcare area, operating room and hospitalization room, etc., become work education activities when the members of the so-called "teaching pyramid" participate, consisting of of students, interns, residents and their tutor specialist, applying established ethical principles and patient safety protocols. [5, 9]

Likewise, the outpatient consultations performed by the general surgeon in the health areas constitute a transcendental activity in the preventive treatment of colon cancer. In practice, they are performed by resident doctors or individual experts. During the execution process, patients who must be prescribed due to risk factors related to colon cancer (ulcerative colitis, colon polyps, positive fecal occult blood test, family history of colon cancer, etc.) do not receive treatment from family doctors, and family doctors have not determined these factors. These shortcomings, among other reasons, constrain the late diagnosis of the disease.

On the other hand, the residents do not attend the specialized consultations during the postoperative follow-up of these patients, where the appropriate adjuvant treatment (chemotherapy, radiotherapy, immunotherapy) is determined together with the oncologist. In addition, this means that the physician's meeting at discharge must be attended together with the family physician, but not with all designated professionals. Therefore, patients and their families lack detailed guidance on postoperative monitoring.

The diagnosis and treatment of the colon cancer patient requires the action of multidisciplinary teams, but the interdisciplinary training of the resident is not contemplated in the curriculum.

When reviewing the analysis of the current General Surgery Specialty Program [4] regarding the development of theoretical content and practical skills to deal with colon cancer, the first year establishes the performance of a colostomy, a stage in which the resident is not prepared to perform this type of surgical procedure, especially when he/she has not yet rotated through the specialty of coloproctology. In the second year, the performance of colectomies (right, left, transverse and sigmoid) is specified. However, at this stage the resident has not yet developed sufficient surgical skills to do so.

On the other hand, during the performance of colectomy, vascular or visceral lesions may occur in the duodenum, kidneys, ureters, etc; a complex situation that is not contemplated in the program and that, once produced, must be solved immediately, for which the resident must be trained in the corresponding services.

It can be seen that there is no adequate systematization for the content of colon cancer during the years of the residency, nor in the progressive development of surgical skills. This shows the need to stratify the specific content on this topic during the years of the residency, so that this professional can progressively apply the knowledge and develop the surgical skills, with an ascending level of complexity and an adequate flexibility to the variations of the medical-surgical assistance. It is also important that he/she is submitted to a process of systematic evaluation of all the activities concerning the education in the work on the topic, mainly in the surgical practice in the operating room.

This analysis reveals the deficiencies in logical methodology and limitations in theoretical and practical content that arise during the training process of general surgical residents, which affect their professional performance. On the other hand, insufficiencies are evidenced in the didactic exercise of education at work during the training of these professionals.

3. Proposed Methodology

The general objective is to guide the methodological procedures to be followed in the surgical-assistance dynamics of on-the-job education in the comprehensive care of patients with colon cancer.

The holistic nature of this training runs throughout the entire specialization training period and unfolds as follows.

3.1 The first year

3.1.1 Objective

To identify the risk factors associated with colorectal cancer, the principles of preventive and curative treatment of this neoplasm, and to develop surgical skills as an instrumentalist in colorectal surgery.

3.1.2 Contents

(1) Anatomical, morphological and physiological basics of large bowel surgery (surgical anatomy, embryology, histology, and physiology of the large bowel).

(2) Preoperative and postoperative management for colon surgery.

a. Preoperative treatment: general and colon preparation.

b. General postoperative treatment.

(3) Preventive treatment of colon cancer.

(4) Fundamentals of large bowel surgery.

3.1.3 Teaching procedures

(1) Seminars

- Morphology and physiology of the large intestine.
- Preoperative and postoperative treatments for colon surgery.
- Prevention of colon cancer.
- Fundamentals of large bowel surgery.

(2) Education at work

- Interconsultations at the primary care level, in order to identify dispensed patients with risk factors related to the presence of colon cancer.
- Visits to hospital wards where patients with this neoplasm are admitted, in which the resident must identify the risk factors and record the preoperative preventive treatment and general postoperative treatment.
- Diagnostic discussions of patients admitted for this cause, with emphasis on the clinical-epidemiological-surgical method according to their level. It can be combined with a clinical-radiological or clinical-pathological discussion and anatomical pieces, deepening in the coincidence between the integral preoperative diagnosis with the surgical diagnosis.
- Medical ward. Diagnostic discussion in patients with intestinal occlusion or lower gastrointestinal bleeding, as complications of colon cancer, and application of the clinical-surgical approach.

(3) Surgical skills

Participation as an instrumentalist in elective and emergency operations on patients with colon cancer to familiarize the resident with the technical details, instruments and sutures required in each step established for each operation, depending on the location of the tumour.

3.2 The second year

3.2.1 Objective

To determine the preoperative staging of colon cancer according to clinical, imaging, endoscopic and anatomopathological findings, as well as the postoperative staging, based on surgical and anatomopathological diagnoses. Surgical techniques corresponding to colostomies must also be developed.

3.2.2 Contents

(1) Diagnosis of colon cancer using the clinical-epidemiological method, imaging, endoscopic and anatomopathological studies.

(2) Preoperative staging: role of the multidisciplinary team.

(3) Postoperative staging: role of the multidisciplinary team.

(4) Colostomies. Classification. Indications. Details of technique. Complications.

3.2.3 Teaching procedures

(1) Seminars

- Determining factors for adequate preoperative staging of colon cancer.
- Determining factors for adequate postoperative staging of colon cancer.

(2) Workshop

- Preoperative staging with the joint participation of specialists in oncology, pathology, imaging and gastroenterology.
- Postoperative staging with the joint participation of specialists from anatomical pathology, oncology, radiotherapy and immunology.

(3) Surgical techniques symposium

Colostomies. Classification according to location, permanence, purpose and surgical technique. Indications according to location (cecostomy, transversostomy and Hartmann sigmoidostomy). Colostomy complications and their closure.

(4) Education at work

- Consultations at the primary level of care alternating with those at the secondary level. In the latter, emphasis should be placed on the postoperative staging of patients who have undergone surgery and its importance for adjuvant treatment.
- Diagnostic discussions in hospital wards and secondary level consultations, with emphasis on preoperative and postoperative staging of these patients.
- Cases requiring emergency colostomy due to intestinal occlusion or lower gastrointestinal bleeding should be discussed on medical wards.

(5) Surgical skills

In the operating theatre, the resident must perform any type of emergency or elective colostomy using the different techniques, as well as knowing their indications and dealing with their complications.

This year, the resident must rotate through the coloproctology department during school hours, and on-call duty will be in the general surgery department.

As can be seen, the resident's training process in colon cancer surgery has not yet been exhausted, and continues throughout the following years.

3.3 The third year

3.3.1 Objective

To determine the operative treatment of colon cancer according to its topographical location and to perform the appropriate surgical interventions.

3.3.2 Contents

(1) Differential diagnosis of colon cancer according to its topographical location and clinical, imaging, anatomopathological and endoscopic criteria.

(2) Surgical treatment of colon cancer according to tumour location and intestinal suture methods used.

(3) Colectomies. Classification. Indications according to tumour location (right hemicolectomy, extended right hemicolectomy, transversectomy, left hemicolectomy, sigmoidectomy).

3.3.3 Teaching procedures

(1) Seminars

- Differential diagnosis of colon cancer according to its topographical location.
- Surgical treatment of colon cancer according to tumour location.
- Surgical techniques symposium.
- Colectomies, classification and indications according to tumour location (right hemicolectomy, extended right hemicolectomy, transversectomy, left hemicolectomy, sigmoidectomy). Suture methods used in the colon: single-plane, multi-plane, primary or pre-preparation.

(2) Education at work

- Consultations at the primary and secondary care level, with emphasis on the corresponding postoperative follow-up.
- Visits and diagnostic discussions, with emphasis on clinical, evolutionary, imaging, endoscopic and anatomopathological manifestations, according to the location of the tumour.

(3) Surgical skills

In the operating theatre, the resident will perform the colectomy described above, during which, in elective cases, he/she will assess the efficacy of the preoperative colon preparation and the use of bowel suturing by the appropriate method.

3.4 The fourth year

3.4.1 Objective

To identify the complications of colon cancer surgery and their treatment, to determine the prognosis of these patients, and to perform complex surgical techniques for this disease.

3.4.2 Contents

(1) Operative and postoperative complications of colon cancer surgery.

(2) Treatment of injuries that may occur during colon surgery in the duodenum, urinary and vascular tracts, with emphasis on their prevention.

(3) Complex surgeries: total colectomy, Dixon's anterior resection and Miles' abdominoperineal resection.

3.4.3 Teaching procedures

(1) Seminars

- Operative and postoperative complications of colon cancer surgery.
- Treatment of injuries that may occur during colon surgery in the duodenum, urinary and vascular tracts, with emphasis on their prevention.

(2) Surgical techniques symposium

Indications and techniques for complex surgery: total colectomy, pull-through technique, Dixon's anterior resection and Miles' abdominoperineal resection.

(3) Education at work

- Consultations at the primary care level, with emphasis on preventive and secondary treatment, related to postoperative follow-up.
- Diagnostic discussions in hospital wards using the clinical-epidemiological-surgical method and complementary examinations, to emphasize surgical treatment and consider prognostic factors.
- The postoperative staging should be taken into consideration at the discharge meeting for those operated on for colon cancer, in order to establish the appropriate follow-up by the multidisciplinary team and determine the appropriate treatment.

(4) Surgical skills

The resident must identify the injuries that can occur during colon surgery, among the most specific ones those that occur in adjacent viscera, such as the duodenum and ureters, and vascular injuries, know how to prevent them and, if they occur, how to treat them; since he/she has already worked in the specialities of urology and angiology.

A further one-month rotation in the coloproctology department is necessary to incorporate complex operations such as anterior rectal resection and abdominoperineal resection into the surgical knowledge.

The evaluation system in the general surgery residency corresponds to that established in the current residency regulations, [11] which includes the following components: monthly course or formative evaluation recorded in the card, promotion evaluation every 10 school months and graduation evaluation at the end of the four years of the residency, which includes the presentation and defense of the thesis, whose schedule is evaluated throughout the residency.

4. Some Relevant Considerations

In order to be best organized, on-the-job training activities require an initial monthly lecture or seminar to guide everyone, and a final activity to be carried out during the weekly evaluation visit. [12, 13] Other didactic procedures include seminars, workshops or symposiums on surgical techniques, bibliographic reviews, independent work, which should be carried out on a monthly basis.

The interdisciplinary training of the general surgery resident takes the form of workshops to be held in the second year, with the joint participation of specialists in oncology, pathological anatomy, gastroenterology, imaging, radiotherapy, chemotherapy and immunotherapy, in addition to guiding lectures related to the preoperative and postoperative staging of this neoplasm, as part of the comprehensive care of patients with colon cancer. [12]

It should be emphasized that the system is a set of elements that share a determined objective and work jointly and in a coordinated manner to achieve it. Therefore, the possibility of using the functional structural systemic method in research, consistent with the systemic and punctual paradigm, and in correspondence with the use of the general theory of systems and the systemic approach, cannot be ignored. [14] Therefore, as shown in this proposal, it is concretized in a methodological direction through appropriately developed procedures.

The structural systemic method is a process of scientific research that seeks to establish the underlying relationship between virtually isolated events or phenomena in order to formulate a theory that unifies these elements (which make up the system). [14]

By applying this method and providing due explanation, it is consistent with the systemic nature of the methodology from all its components; expression of a systemic logic in the light of the existing methodological orientation.

Consequently, the use of the functional structural systemic method as a methodological guide for the full development of the methodology, in spite of its theoretical character, guarantees its systemic and holistic expression, since it takes praxis as the focus of reflection by integrating it with theory.

Therefore, we suggest the dissemination and generalization of the proposed methodology, since the formative intentionality declared in the current General Surgery Specialty Program does not correspond to the systematizing orientation and formative generalization, as a dialectic contradiction and principle of the didactics of higher education, [15, 16] since there is no adequate epistemological and methodological systematization in the curriculum. Due to its coverage of multiple aspects related to surgical conditions, this is evidenced by segmentation, lack of consistency, and flexibility in application in different contexts of surgeon training. This systemic formative fragmentation of the curriculum does not dynamize the pedagogical process of this training in order to fulfill the proposed objectives.

The author's position on a controversial issue, such as training general surgical residents on increasingly common global tumor diseases such as colon cancer, is based on the need to address an unresolved teaching science issue and create space for discussion and reflection on this suggestion, as well as the suggestions of other authors directly related to the discussed issue.

5. Conclusion

The proposed methodology stratifies the theoretical and practical contents for the subject of colon cancer in particular, with an ascending level of complexity during the four years of the residency in general surgery, and in conjunction with the effective performance of the activities concerning education at work, which can guarantee the training of this professional in the comprehensive care of the patient with colon cancer.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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