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Quality of life and influencing factors in patients with permanent colostomy

A descriptive literature review

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Abstract

Background: Colorectal cancer (CRC) is one of the most common malignant tumors in the world. By 2040, the number of cases of colorectal cancer will increase to 3.2 million per year and the number of deaths will reach 1.6 million per year.

Abdominoperineal resection is a common procedure for the treatment of low colorectal cancer, but it leaves a permanent stoma. So the quality of life (QoL) of these patients deserves attention.

Aim: The aim of the study is to describe the tools to measure the QoL of patients with permanent stoma, the quality of life for patients with permanent colostomy and to identify the factors that influence their quality of life.

Methods: This study was a descriptive literature review, search Pubmed databases for relevant articles. Make tables of the ten articles included and review them carefully.

Result: Tools used to measure QoL in patients with permanent colostomy are EORTC QLQ-C30, EORTC QLQ-CR38, EORTC QLQ-CR29, SF-36, COH-QoL-Ostomy questionnaire, and Stoma QOL. Patients with permanent colostomy had a moderate QoL. Factors affecting QoL in patients with permanent colostomy are Demographic factors (Age, Sex, Living situation, Living area, Body mass index (BMI), Employment status, Spouse or not, Financial burden), Factors related to ostomy(High Colostomy Impact (CI) score, Time after surgery, Bulge or hernia, Fear of leakage, Time to self-care of the stoma, Loss of body image) and Psychosocial factors(Self-efficacy, Truth telling, Communication with patients, Family relationship, Participation in patients activities).

Conclusions: The study found that patients with permanent colostomy had a moderate QoL, which was influenced by demographic factors, stomation-related factors, and socio-psychological factors. In clinical work, transition theory can be used to provide education and support for patients and their families to help patients adapt to the stoma and complete the transition.

Keywords: influencing factors,measuring tools, permanent colostomy, quality of life

摘要

背景：结直肠癌是最常见的恶性肿瘤之一。到 2040 年，结直肠癌的患病人数会增加到 320 万每年，死亡人数将达到 160 万每年。腹会阴切除术是常用的治疗低位性结直肠癌的术式，但会留下一个永久性的造口。因此，这些患者的 QoL 值得被关注。

目的：本研究的目的是描述测量永久性造口患者生活质量的工具，永久性结肠造口患者的生活质量，并确定影响其生活质量的因素。

方法：使用描述性文献综述，检索 Pubmed 数据库中相关的文章。对纳入的十篇文章进行列表并仔细审查。

结果：用于测量永久性结肠造口患者生活质量的工具有 EORTC QLQ-C30、EORTC QLQ-CR38、EORTC QLQ-CR29、SF-36、COH - QoL -CQ 和 Stoma QoL。永久性结肠造口术患者生活质量处于中等水平。影响永久性结肠造口患者生活质量的因素有人口学因素（年龄、性别、居住状况、居住区域、体重指数、就业状况、是否有配偶、经济负担）、造口相关因素（高 CI 评分、术后时间、隆起或疝、担心渗漏、造口自我护理时间、身体形象丧失）和心理社会因素（自我效能感、了解病情）。

结论：研究发现永久性结肠造口患者的 QoL 处于中等水平，会受到人口学因素，造口相关因素和社会心理学因素的影响。临床工作中可以借助过渡理论，为患者及其家属提供教育和支持，帮助患者适应造口，完成过渡。

关键词：影响因素，测量工具，永久性结肠造口，生活质量

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1.Introduction

1.1 Background

Colorectal cancer (CRC) ranks among the most prevalent malignant tumors globally and is the second leading cause of cancer(World Health Organization, 2023). CRC is the second and third most common cancer among women and men, respectively (Kuipers et al., 2015). Projections indicate that by 2020, there were over 1.9 million new CRC cases globally, accompanied by more than 930,000 CRC - related deaths. By 2040, the burden of colorectal cancer will increase to 3.2 million new cases (an increase of 63%) and 1.6 million deaths (an increase of 73%) each year(World Health Organization, 2023). While the typical age of CRC diagnosis is 50 years and above(World Health Organization, 2023), the disease is increasingly affecting younger individuals, with a rising incidence among those under 50(Kim & Hanna, 2023). Surgical resection is the primary treatment approach for CRC. Abdomino-perineal resection (APR), which is also known as the Miles operation, is a commonly used surgical procedure for treating low rectal cancer. In addition to this, there are various surgical procedures that preserve the function of the anal sphincter, such as Low anterior resection (LAR). Nevertheless, when tumors are located in close proximity to the anus, patients often require APR, resulting in the establishment of a permanent stoma(Zhong et al., 2023).

1.2 Definition

1.2.1 Colorectal cancer

Colorectal cancer is a malignant epithelial tumor originating in the colon or rectum. Its development is associated with multiple risk factors, including a high - calorie diet, sedentary lifestyle, meat consumption, smoking, alcohol intake, radiation exposure, and certain intestinal diseases such as chronic inflammation, ulcerative colitis, and Crohn's disease(Hamilton et al., 2006).

1.2.2 Colorectal cancer patients

Colorectal cancer patients in this review refer to patients with a permanent colostomy after surgery.

1.2.3 Colostomy

A colostomy is a surgical procedure in which the colon or small intestine is anastomosed to the skin(Mathieu et al., 2024). The primary function of a colostomy is to replace the rectum, where feces enter the stoma from the intestine and then flow into a bag attached to the skin for storage. This collection bag requires regular replacement (sometimes more than twice a day)(Mathieu et al., 2024). Colostomy may be temporary and/or permanent(Salomé & De Almeida, 2014).

1.2.4 Quality of life (QoL)

QoL is defined as an individual's perception of their life within the framework of their specific culture and value system. This perception is associated with their goals, expectations, standards, and concerns(World Health Organization Quality of Life Assessment Group, 1996). Quality of life is categorized five dimensions: physical wellbeing, material wellbeing, social wellbeing, emotional wellbeing, and development and activity(Felce & Perry, 1995).

1.3 Theory

The transition theory encompasses six main concepts: types and patterns of transitions, properties of transition experiences, transition conditions: facilitators and inhibitors, process indicators, outcome indicators, and nursing therapeutics(Meleis et al., 2000). Types of transitions include developmental, health and illness, situational, and organizational(Meleis et al., 2000). Patterns of transitions include single, multiple, sequential, simultaneous, related, and independent(Meleis et al., 2000). Properties of transition experiences include awareness, engagement, change and difference, time span, critical points and events(Meleis et al., 2000). Transition conditions: facilitators and inhibitors include personal conditions, cultural beliefs and attitudes, socioeconomic status, preparation and knowledge, community conditions, and societal conditions(Meleis et al., 2000). Process indicators include feeling connected, interacting, location and being situated, developing confidence and coping. Outcome indicators include mastery and fluid integrative identities(Meleis et al., 2000). Nursing therapeutics include readiness assessment, transition preparation, and role replenishment(Meleis et al., 2000). In this review, the authors believe that transition theory can help nurses assist patients in realizing that they are shifting from not having a stoma to having one, and that family members are transforming into caregivers.

Moreover, the theory facilitates the active participation of patients and their families in this transition process. During this period, nurses can offer support and education to patients and their families, imparting knowledge about stomas and self - care skills, which ultimately enhances the patients' quality of life.

1.4 Early reviews

Previous reviews have investigated the QoL in ostomy patients, with one review mentioning that QoL in patients with ostomy decreased in the first month after surgery and gradually recovered after six months(Juul & Prieto, 2008). Habib et al., (2020) mentioned that ostomy had a negative impact on QoL in patients. Earlier reviews also compared the QoL of patients with permanent stoma with that of temporary stoma, one article(Pachler & Wille-Jørgensen, 2012) mentioned that the QoL of patients with permanent stoma was not inferior to that of those with temporary stomas and one article (Fisher & Daniels, 2006) mentioned that the impact of permanent colostomy on QoL remained unclear. There are four reviews focused on complications associated with stoma (Babakhanlou et al., 2022; Dawes & Gahagan, 2024; Krishnamurty et al., 2017). Those studies showed that stoma complications such as parastomal hernia, stoma prolapse, stoma ischemia and necrosis, stoma retraction and stenosis, skin irritation, high output stomas. Three articles(Ayaz-Alkaya, 2019; Juul & Prieto, 2008; Michońska et al., 2023) mentioned that the stoma brought about changes in body image, sexual problems, psychosocial problems, nutritional problems, sleep problems, skin problems around the stoma. The majority of prior studies did not distinguish between temporary and permanent stoma, did not conduct targeted studies on permanent stoma, and did not conduct in-depth studies on the influencing factors of QoL in patients with permanent colostomy. The authors believed that it is very necessary to study the QoL and influencing factors of QoL in patients with permanent colostomy, because the number of patients with colorectal cancer is increasing and younger in the world(Kim & Hanna, 2023; World Health Organization, 2023). The Miles operation, a common treatment for low - lying colorectal cancer, but this method will leave permanent colostomy. In addition, after understanding the factors that affect the QoL in patient with permanent colostomy, clinicians can raise specific care questions, formulate care plans, and provide higher quality care. Relatives and friends of patients can help patients with

stoma care, encourage patients, provide psychological support, and improve patients' QoL.

1.5 The nurse's role

The effective management of colostomies necessitates interdisciplinary teams to deliver professional care. Nursing care for ostomy patients encompasses postoperative care within hospital settings and long - term care provided by outpatient care centers following hospital discharge. Ostomy care nurses are accountable for managing various aspects of ostomy care, such as diagnosing the underlying condition and maintaining care continuity post - discharge(Shoja et al., 2024). Nurses have made significant contributions in preventing complications for patients. Marking the site of the stoma before surgery can reduce the incidence of complications, and preoperative consultation can help patients adjust their stoma after surgery(Cahide Ayik, MSc et al., 2020). The extensive experience, high educational attainment, and profound professional nursing knowledge of stoma - care nurses are advantageous for patients during ostomy management(Shoja et al., 2024). Moreover, nurses' health education for patients and their families plays a crucial role in enabling patients to perform self - care for their stomas. Structured patient education can effectively enhance patients' knowledge and practice of stoma and skin care around stomas(Abdelmohsen, 2020).

1.6 Problem statement

Colorectal cancer exhibits a remarkably high incidence globally, and colostomy represents one of the most prevalent treatment modalities for this disease. Previous studies showed that stoma can affect the quality of life and are associated with numerous stoma - related complications. Nevertheless, a majority of earlier studies failed to differentiate between permanent and temporary stomas. Additionally, these early investigations did not comprehensively summarize the assessment tools applicable for measuring the quality of life of patients with permanent colostomies. Consequently, the impact of permanent colostomy on patients' quality of life remains an area warranting further exploration, as do the factors influencing this quality of life.

1.7 Aim and research questions

The aim of the study was to describe the tools used to assess quality of life in patients with a permanent colostomy and to identify key factors that influence their QoL.

Research questions:

1. Which instruments are commonly used to assess the quality of life in patients with a permanent colostomy?
2. What is the reported quality of life among individuals living with a permanent colostomy?
3. What factors have been identified as influencing the quality of life in patients with a permanent colostomy?

2. Method

2.1 Design

A descriptive literature review was conducted (Polit & Beck, 2017).

2.2 Search strategy

PubMed was utilized as the database for this review. The authors used "colostomy"[MeSH] AND "permanent" [TiAb] AND "quality of life"[TiAb] as search terms (Polit & Beck, 2017). The authors' used the Boolean operator "AND" for a complete search (Polit & Beck, 2017). The restrictive word was "full text, 10 years". In the search (see Table 1) the titles and abstracts of 49 articles were skim-read and 28 articles, deemed to be of potential interest for the literature review, were selected.

Table 1. Results of database searches

Database + Date of search	Limits	Search terms	Number of hits
Medline through PubMed 2024-04-23	10 years, English, full text	colostomy[MeSH]	1425
Medline through PubMed 2024-04-23	10 years, English, full text	permanent[TiAb]	55344
Medline through PubMed 2024-04-23	10 years, English, full text	"quality of life"[TiAb]	244318
Medline through PubMed 2024-04-23	10 years, English, full text	colostomy[MeSH] AND permanent[TiAb] AND "quality of life"[TiAb]	49
Total			49

2.3 Selection criteria

2.3.1 Inclusion Criteria

- The article's content was related to the quality of life of patients with permanent colostomy.
- The articles were quantitative study.
- The population was adults with permanent colostomy.

2.3.2 Exclusion criteria

The articles that did not distinguish between permanent colostomy and temporary colostomy.

2.4 Selection process and outcome of potential articles

The authors screened out quantitative articles. Then read the title and abstract of the article to determine whether these would assist in answering the research questions in the literature review. Articles that did not address the research questions were screened out. Thereafter, a more thorough review of the full content of the selected articles was conducted to determine if they can be viewed in their entirety and are relevant to the literature review. Each step of the selection process was carefully considered by the authors (see Figure1).

2.5 Data analysis

The authors individually read all the included articles, analyzed the contents of the articles, extracted the information to answer the questions of this study, and then summarized, categorized, and classified the information. This process yielded three tables. Tables 1 and 2 were developed using the methods of summary and induction, whereas Table 3 utilized the methods of summary, induction, and classification.

2.6 Ethical considerations

The literature cited in this article is licensed and authorized, and does not violate ethical rules. The article was objectively read and reviewed, free from the influence of the authors' personal opinions and attitudes. The results are presented comprehensively and are not subject to alteration based on the authors' personal preferences. There are no plagiarism in this degree program.

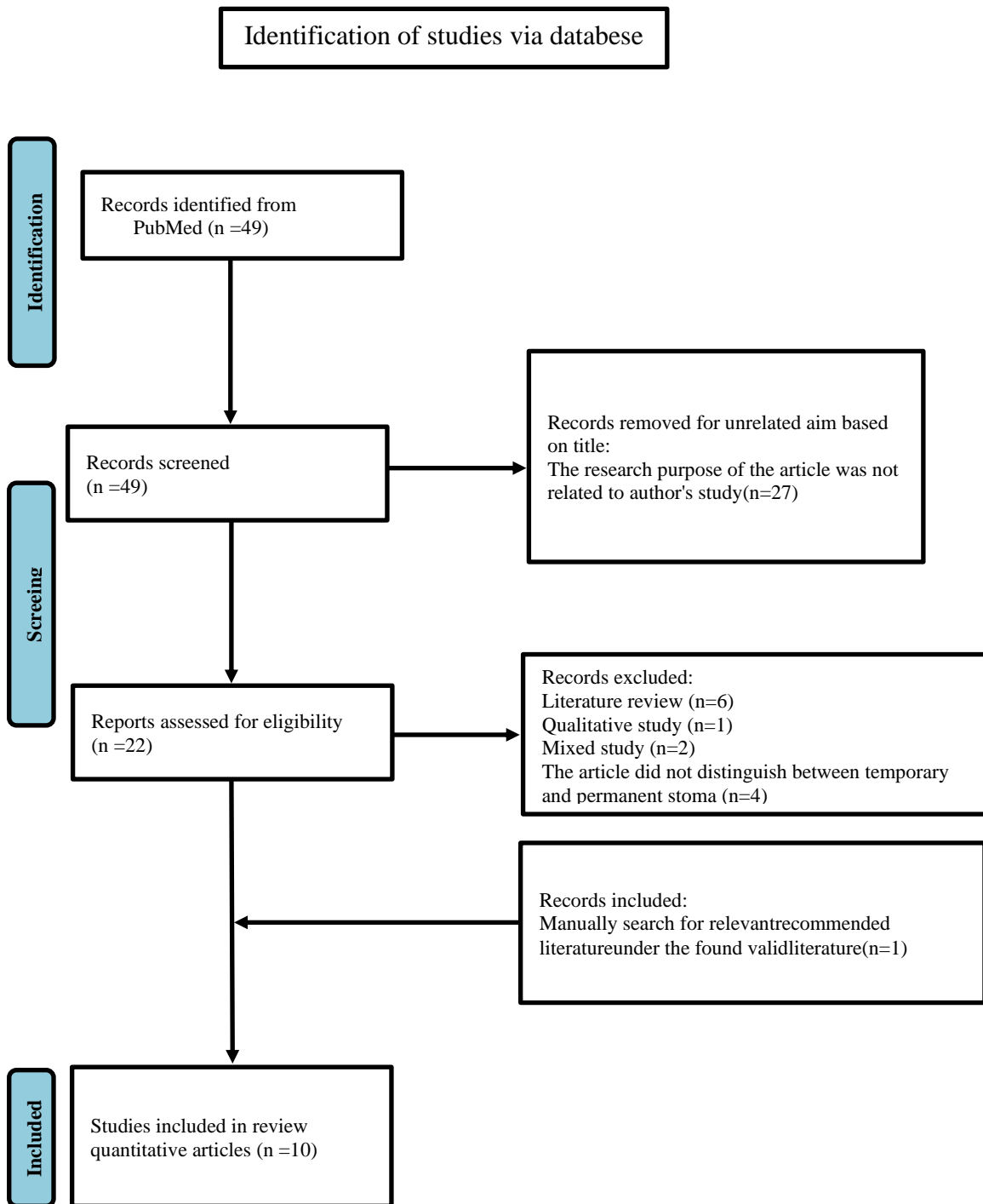


Figure1. Selection process according to PRISMA(Page et al., 2021)

3. Result

This study included ten articles from Egypt(El-Rahman Mohamed et al., 2022), Denmark(Fedderm et al., 2015; Kristensen et al., 2022), Turkey(Kement et al., 2016),

Sweden(Näsvall et al., 2017), Brazil(Silva et al., 2018) and China(He & Bian, 2019; Tong et al., 2020; Yan et al., 2022; Yang et al., 2014). The articles were published from 2014 to 2024. According to the study of these articles, there are six tools commonly used to measure the QOL of patients with permanent colostomy, European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Core30 (EORTC QLQ-C30)(Kristensen et al., 2022; Näsvall et al., 2017; Silva et al., 2018; Tong et al., 2020; Yang et al., 2014), European Organization for Research and Treatment of Cancer Colorectal Cancer-specific Quality of Life Questionnaire Module (EORTC QLQ-CR38)(Näsvall et al., 2017), European Organization for Research and Treatment of Cancer questionnaire module for colorectal cancer (EORTC QLQ-CR29)(Silva et al., 2018), 36-item short-form health survey (SF-36)(He & Bian, 2019; Kement et al., 2016; Näsvall et al., 2017), and City of Hope Quality of Life Ostomy questionnaire(COH-QoL-OQ)(El-Rahman Mohamed et al., 2022), Stoma quality of life(Stoma QOL)(Yan et al., 2022)(See Table 2). Using the above scale, patients with permanent colostomy were found to have a moderate QOL(See Table 3). There are three factors that affect QOL in patients with permanent colostomy: Demographic factors (Age, Sex, Living situation, Living area, BMI, Employment status, Spouse or not, Financial burden), Factors related to ostomy(High CI score, Time after surgery, Bulge or hernia, Fear of leakage, Time to self-care of the stoma, Loss of body image) and Psychosocial factors(Self-efficacy, Truth telling, Communication with patients, Family relationship, Participation in patients activities) (See Table 4).

3.1 Tools for measuring QOL in patients with permanent colostomy

3.1.1 EORTC QLQ-C30

EORTC QLQ-C30 was developed by Aaronson, N.K. et al. in 1993. There are five functional scales, three symptom scales, six individual scales, one general QOL health status, and 30 questions. The 28 items are graded in four levels, with "Not at all" (1 point), "A little" (2 points), "Quite a bit" (3 points), and "Very much" (4 points). The two items are graded in seven levels, with "very poor" (1 point) and "Excellent" (7 points), with "Very poor" (1 point) and "Excellent" (7 points), and the scores of all items are converted to a 0-100 scale using linear transformations. The higher the functional score, the higher the QoL, and the higher the symptom score, the lower the

QoL. In this review, five articles (Kristensen et al., 2022; Näsvalld et al., 2017; Silva et al., 2018; Tong et al., 2020; Yang et al., 2014) used the original version (Aaronson et al., 1993).

3.1.2 EORTC QLQ-CR38

EORTC QLQ-CR38 was developed by Sprangers, M.A. et al. in 1999. There are four functional scales, eight symptom scales, and 38 items. The 38 items are graded in four levels, with "Not at all" (1 point), "A little" (2 points), "Quite a bit" (3 points), and "Very much" (4 points). The scores for all items are converted to a 0-100 score using linear transformations. The higher the functional score, the higher the QoL, and the higher the symptom score, the lower the QoL. In this review, one article (Näsvalld et al., 2017) used the original version (Sprangers, 1999).

3.1.3 EORTC QLQ-CR29

EORTC QLQ-CR29 was developed by Whistance, R.N. et al. in 2009. There are four scales, 19 single items, and 29 items. The 29 items are graded in four levels, with "Not at all" (1 point), "A little" (2 points), "Quite a bit" (3 points), and "Very much" (4 points). The scores for all items are converted to a 0-100 score using linear transformations. The higher the functional score, the higher the QoL, and the higher the symptom score, the lower the QoL. In this review, one article (Silva et al., 2018) used the original version (Whistance et al., 2009).

3.1.4 SF-36

SF-36 was developed by Stewart et al. in 1988. There are physical functioning scales, Role-physical scales, bodily pain scales, general health scales, vitality, social functioning scales, emotional role scales and mental health scales, and 36 items. This scale uses grade assignment. The total score of the subscale is converted to a score of 0-100 using the following formula: $\frac{\text{(actual raw score - lowest possible raw score)}}{\text{possible raw score range}} \times 100$. In this review, one article (He & Bian, 2019) used the Chinese version (Li et al., 2002), one article (Kement et al., 2016) used the Turkish version (Pinar, 2005), one article (Näsvalld et al., 2017) used the Swedish version (Sullivan et al., 1995).

3.1.5 COH-QoL-OQ

COH-QoL-OQ was developed by Marcia Grant et al. in 2004. There are physical scales, psychological scales, social scales, spiritual scales, and 43 items. All items were graded in 11 levels, with 0 being the worst and 10 being the best. 1-12, 15, 18-19, 22-30, 32-34, and 37 are reverse-coded, with 0 representing the best and 10 representing the worst. The total score is the sum of the scores for all the items. In this review, one article(El-Rahman Mohamed et al., 2022) used the Arabic version(El-Rahman Mohamed et al., 2022).

Table 2. Measurement tool for QoL in patients with permanent colostomy

Questionnaire	Developer	Year	Version
European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Core 30 (EORTC QLQ-C30)	Aaronson, N.K. et al.	1993	Original (Kristensen et al., 2022), (Näsval et al., 2017),(Silva et al., 2018), (Tong et al., 2020), (Yang et al., 2014)
European Organization for Research and Treatment of Cancer Colorectal Cancer-specific Quality of Life Questionnaire Module (EORTC QLQ-CR38)	Sprangers,M.A. et al.	1999	Original (Näsval et al., 2017)
European Organization for Research and Treatment of Cancer questionnaire module for colorectal cancer (EORTC QLQ-CR29)	Whistance, R.N. et al.	2009	Original (Silva et al., 2018)
36-item short-form health survey (SF-36)	Stewart et al.	1988	Chinese version (He et al., 2019) Turkish version (Kement et al., 2016) Swedish version (Näsval et al., 2017)
City of Hope Quality of Life Ostomy (COH-QoL-Ostomy) questionnaire	Marcia Grant et al.	2004	Arabic version (El-Rahman Mohamed et al., 2022b)
Stoma quality of life(Stoma QOL)	Luis Prieto et al.	2005	Chinese version (Yan et al., 2022)

3.1.6 Stoma QOL

Stoma QOL was developed by Luis Prieto et al. in 2005. There are the stoma burden scales, social relationship scales, stoma anxiety scales, and daily routine scales, and 20 items. All items are graded in four levels, with "Always" (1 point), "Sometimes" (2 points), "Rarely" (3 points) and "Never" (4 points). The total score is the sum of the scores for all items and ranges from 20 to 80, with the higher the score the better the

quality of life. In this review, one article(Yan et al., 2022) used the Chinese version(Lin Lyu et al., 2015).

3.2 QOL in patients with permanent colostomy

Five studies(Kristensen et al., 2022; Näsvalld et al., 2017; Silva et al., 2018; Tong et al., 2020; Yang et al., 2014) used the EORTC-QLQ-C30 to measure the QOL in patients with permanent colostomy. A total of 3066 patients were included in these measurements, with ages ranging from 22 to 97 years. The measurement time spanned from 1 to 470 months post-surgery, and the scores obtained ranged from 28.7 to 78.57. One study(Näsvalld et al., 2017) used the EORTC-QLQ-CR38 to measure the QOL in patients with permanent colostomy. A total of 336 patients were measured, ranging in age from 35 to 97 years, and the measurement time was from 48 to 155 months after surgery. The scores of functioning were 300.8, and the scores of urination problems were 24.9. Men scored 54.0 for sexual problems, women scored 25.6 for sexual problems, and the scores of weight loss were 8.5.

One study(Silva et al., 2018) used the EORTC-QLQ-CR29 to measure the QOL in patients with permanent colostomy. A total of 42 patients were measured, ranging in age from 51 to 76 years, and the measurement time was at least 12 months after surgery, with a functioning score of 286.1 and a symptom score of 175.

Three studies(He & Bian, 2019; Kement et al., 2016; Näsvalld et al., 2017) used the SF36 to measure the QOL in patients with permanent colostomy. A total of 490 patients were measured, ranging in age from 28 to 97 years, and the measuring time was from 6 to 155 months after surgery, with scores ranging from 428.38 to 575.

One study(El-Rahman Mohamed et al., 2022) used the COH-QoL-Ostomy questionnaire to measure the QOL in patients with permanent colostomy. A total of 158 patients were measured, ranging in age from 49 to 67 years, and the measuring time was at least 3 months after surgery. The score was 129.61 ± 98 .

One study(Yan et al., 2022) use the Stoma-QoL to measure the QOL in patients with permanent colostomy. A total of 74 patients were measured, ranging in age from 46 to 67 years, and the measuring time was from 0-3 months after surgery, and their scores were 46.01 points before discharge, 50.72 points one month after surgery, and 63.85 points three months after surgery.

Table 3. QoL scores in patients with permanent colostomy

Questionnaire	Scores	Patients	Measuring time
SF36	428.38-575	490 (28-97)	6-155months
EORTC QLQ-C30	28.7-78.57	3066 (22-97)	1-470months
EORTC QLQ-CR38	Function scale:300.8, symptom scale: micturition problems24.9, male sexual problems54.0, female sexual problems25.6, weight loss8.5	336(35-97)	48-155 months
EORTC QLQ-CR29	Function scale:286.1, symptom scale:175	42 (51-76)	At least 12 months after surgery
COH-QoL-OQ	129.61±98	158 (49-67)	At least 3 months after surgery
Stoma-QOL	46.01 before discharge, 50.72 one month after discharge, and 63.85 three months after discharge	74 (46-67)	0-3 months

Note: In SF-36, EORTC QLQ-C30, COH-QoL-OQ and Stoma-QOL: High value= High QoL. In EORTC QLQ-CR38, EORTC QLQ-CR29: High value= High QoL in Function scale, High value= Low QoL in Symptom scale.

3.3 Influencing factors of QOL in patients with permanent colostomy

3.3.1 Demographic factor

Age, sex, living situation, living area, body mass index(BMI), Employment status, spouse or not and financial burden are the factors affecting the quality of life of patients with permanent colostomy. In the studies of Feddern et al.(2015) and Kristensen et al.(2022), it was showed that age was an influential factor in the quality of life of colostomy patients ($p < 0.006$, $p < 0.001$; OR=1.02, 95% c.i.(1.01,1.02), $p < 0.001$. Kement et al.(2016) showed that gender, living situation and living area were the influencing factors for the quality of life of colostomy patients ($p=0.002$; $p < 0.001$). Kristensen et al.(2022) found that BMI (OR= 1.02, 95% c.i.(1.00,1.04), $p=0.039$), Employment status (OR=3.17, 95% c.i.(1.98,5.09), $p < 0.001$), spouse or not (OR=1.31, 95% c.i.(1.08,1.58), $p=0.006$) and financial burden (OR=2.39, 95% c.i.(1.83,3.12), $p < 0.001$) were the factors affecting the quality of life of patients with colostomy.

3.3.2 Factors related to ostomy

High CI score, time after surgery, bulge or hernia, fear of leakage, time to self-care of the stoma, and loss of body image are factors influencing quality of life in patients with permanent colostomy. Kristensen et al.(2022) found that a high Colostomy Impact(CI) score was an influential factor in the quality of life of colostomy patients (OR=3.42, 95%c.i. (2.81, 4.15), $p < 0.001$). Five studies(He & Bian, 2019; Kristensen et al., 2022; Tong et al., 2020; Yan et al., 2022; Yang et al., 2014) showed that postoperative time is an influential factor in the quality of life of patients with permanent colostomy. ($p < 0.05$; OR=0.95,95%c.i.(0.92,0.98), $p=0.003$; $p=0.002$; $p < 0.01$); Näsvalld et al.(2017) found that bulge or hernia ($p < 0.05$) and fear of leakage ($p < 0.001$) were factors affecting the quality of life of patients with permanent colostomy. According to Yan et al.(2022), ostomy self-care time ($\beta=0.365$, $p < 0.01$) and body image loss ($\beta=0.151$, $p < 0.01$) were influential factors for quality of life in patients with permanent colostomy.

Table 4. Influencing factors of QoL in patients with permanent colostomy

Category	Finding
Demographic factor	Older/younger
	Sex
	Living situation
	Living area
	BMI (Body mass index)
	Employment status
	Spouse or not
Factors related to ostomy	Financial burden
	High CI(Colostomy Impact) score
	Time after surgery
	Bulge or hernia
	Fear of leakage
Psychosocial factors	Time to self-care of the stoma
	Body image loss
	Self-efficacy
	Truth telling
	Communication with patients
	Family relationship
	Participation in patients' activities

3.3.3 Psychosocial factors

Self-efficacy, truth telling, communication with patients, family relationship and participation in patients activities are factors influencing quality of life in patients with

permanent colostomy. Yan et al. (2022) showed that self-efficacy (before discharge: $\beta=0.479$, one month after discharge: $\beta=0.650$, three months after discharge: $\beta=0.971$, $p < 0.01$), truth telling ($\beta=-0.236$, $p < 0.01$), communication with patients ($\beta=0.309$, $p < 0.01$), family relationship ($\beta=-0.26$, $p < 0.01$), participation in patients activities ($\beta=-0.114$, $p < 0.05$) were the influencing factors of quality of life in patients with permanent colostomy.

4. Discussion

4.1 Main result

This review included 10 articles. Through an in - depth analysis of these articles, it was found that the instruments used to measure the QoL of patients with permanent colostomy were EORTC QLQ-C30, EORTC QLQ-CR38, EORTC QLQ-CR29, SF-36, COH-QoL-Ostomy questionnaire, and Stoma QOL. QoL scores of patients with permanent colostomy were 428.38-575 in SF-36, 28.7-78.57 in EORTC QLQ-C30, 300.8 in function scale, symptom scale: 24.9 in micturition problems, 24.9 in male sexual problems, 25.6 in female sexual problems, 8.5 in weight loss in EORTC QLQ-CR38, 286.1 in function scale, 175 in symptom in EORTC QLQ-CR29, 129.61±98 in COH-QoL-Ostomy questionnaire, before discharge: 46.01, one month after discharge: 50.72, and three months after discharge: 63.85 in Stoma-QOL. The QoL of patients with permanent colostomy was lower than that of the normal population and the population without colostomy. The influencing factors of QoL in patients with permanent colostomy encompassed demographic factors, factors related to ostomy, and psychosocial factors.

4.2 Result discussion

Early studies that summarized the tools for measuring the quality of life of Stoma patients were scarce. In this review, it was found that EORTC QLQ-C30, EORTC QLQ-CR38, EORTC QLQ-CR29, SF-36, COH-QoL-Ostomy questionnaire, and Stoma QOL are excellent tools for measuring the quality of life of stoma patients. The five tools are specifically designed as ostomy - related questionnaires but SF - 36. Although the SF - 36 is applicable to all populations, it exists in multiple versions and has demonstrated good reliability and validity. Authors think that the EORTC QLQ-CR29

is more appropriate for assessing the quality of life of patients with permanent colostomy. This questionnaire, specifically designed for colorectal cancer patients, exhibits greater conciseness and pertinence in its content compared to the CR38. Additionally, it demonstrates superior reliability and sensitivity in evaluating the treatment outcomes of postoperative colorectal cancer patients.

A study (Neuberger et al., 2022) showed that the quality of life of patients with permanent colostomy is lower than that of patients without colostomy, and this finding is consistent with the results of this review. The presence of a stoma represents a significant new event for patients, altering their lifestyle and family dynamics. According to the transition theory, patients undergo a transitional period after experiencing such key events (Meleis et al., 2000). In response to this change, patients may adopt a different perspective on the world and others, which can restrict their social interactions, employment opportunities, and other aspects of life. Patients are aware of the ongoing changes and need to actively engage in the process of adaptation, which is a long-term journey from illness to recovery (Meleis et al., 2000). Therefore, the stoma has a negative impact on the QoL of patients.

Ito et al. (2005) found that the influencing factors of QoL in patients with permanent colostomy included age, employment status, whether they live with others, and postoperative time. Vonk-Klaassen et al. (2016) showed that the problems associated with ostomy, such as fear of leakage, body image is a factor in the QoL of patients with ostomy. Alenezi et al. (2021) showed that gender and family support were influencing factors for QoL in patients with ostomy. Sritan (2023) showed that age, gender, BMI, body image, marital status, and family support were influential factors for QoL in ostomy patients. These results are consistent with those of the authors. According to the transition theory, Personal conditions, Community conditions and Societal conditions are important factors affecting individual adaptation (Meleis et al., 2000). So age, employment status, whether they live with others, and postoperative time, fear of disclosure, body image, gender, family support, BMI, Marital status are influential factors of QoL in colostomy patients.

4.3 Methods discussion

The review utilized PubMed as a database, which was developed by the National Center for Biotechnology Information (NCBI), part of the National Library of Medicine (NLM). It includes literature from the MEDLINE database, as well as several other resources. Search method was scientific and standardized, used "colostomy", "permanent", "quality of life" as keywords, and Boolean operator "AND" was comprehensively applied to perform a logical combination of these keywords for accurate retrieval (Polit & Beck, 2017). The authors' method of screening articles follows the PRISMA statement (Page et al., 2021), objectively and systematically described the result. The authors only used one database for article retrieval and did not include articles from all databases, which may have introduced limitations to the research findings.

4.4 Clinical implications

This review summarized the commonly used tools for measuring the QoL in patients with permanent colostomy. These tools enable clinical workers to assess the QoL of such patients, thereby facilitating an understanding of their living standards. This review summarized the QoL of some patients with permanent colostomy, which can provide reference for clinical workers. Clinical workers can refer to the influencing factors summarized in this review and provide tailored assistance to patients to improve their quality of life.

4.5 Suggestions for future research

For researchers interested in topics related to permanent colostomy, searching multiple databases during the study is advisable to collect relevant information in multiple dimensions and aspects, thereby providing more comprehensive data support for the research. This study systematically stated the influencing factors of QoL in patients with permanent colostomy, and future researchers could conduct intervention studies based on the above influencing factors to verify the effectiveness of various intervention measures.

4.6 Conclusions

The study found that patients with permanent colostomy had a moderate QoL, which was influenced by demographic factors, stomation-related factors, and socio-

psychological factors. In clinical work, transition theory can be used to provide education and support for patients and their families to help patients adapt to the stoma and complete the transition.

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Appendix

Table 5. Selected studies included in the review

Author(s)	Title	Design(possibly approach)	Participants	Data collection method(s)	Data analysis
El-Rahman Mohamed, M. A., El-Ata, A. B. A., & Elezaby, H. H. (2022).	Relationship between resilience and health-related quality of life among patients with a permanent colostomy.	The study was descriptive in cross-sectional design.	158 patients from the Egyptian Institute of Oncology who had undergone permanent colostomy at least three months after surgery, aged 58.2±8.70. There were 78 males and 80 females.	The study used the COH-QoL-Ostomy questionnaire and Resilience scale to collect data.	1. descriptive analysis. 2. The correlation coefficient of Pearson.
Feddern, M. L., Emmertsen, K. J., & Laurberg, S. (2015).	Life with a stoma after curative resection for rectal cancer: a population-based cross-sectional study.	The study was a population-based cross-sectional study.	Among 644 patients from Denmark who underwent rectal cancer surgery, the median age was 72 (29-96), with 232 women and 412 men, 2-8 years after surgery.	The study used a questionnaire developed by the author's department for data collection.	1. Mann–Whitney U test. 2. chi-squared test. 3. Ordinal logistic regression.
He, Y., Bian, L.	Investigation on Quality of Life of Patients with Permanent Colostomy in Rectal Cancer in Yancheng City	The study was a longitudinal study.	Among 110 Chinese patients after permanent colostomy surgery, 15 were ≤45 years old, 41 were 46-59 years old, and 54 were ≥60 years old. There were 71 males and 39 females. The follow-up time was 6 months and 12 months after operation.	The study used the SF36 questionnaire to assess patients' quality of life.	1. T test. 2. χ^2 test.
Kement, M., Gezen, C., Aydin, H., Haksal, M., Can, U., Aksakal, N., & Öncel, M. (2014).	A descriptive survey study to evaluate the relationship between socio-demographic factors and quality of life in patients with a permanent colostomy.	The study was a prospective, descriptive study.	44 patients from Kartal Training and Research Hospital in Turkey who had undergone surgery for rectal cancer at least 6 months after surgery were aged 56.6 ± 12.8 [range 28-76],	The study used a socio-demographic questionnaire and Religious Orientation Scale and a QoL survey. SF36.	1. Student's t-tests. 2. one-way ANOVA. 3. Multivariate analyses. 4. Pearson's bivariate test.

			including 18 women and 26 men.		
Kristensen, H. Ø., Thyø, A., Emmertsen, K. J., Smart, N. J., Pinkney, T., Warwick, A. M., Pang, D., Elfeki, H., Shalaby, M., Emile, S. H., Abdelkhalek, M., Zuhdy, M., Poskus, T., Dulskas, A., Horesh, N., Furnée, E. J. B., Verkuijl, S. J., Rama, N. J., Domingos, H., Maciel, J., ... Christensen, P. (2022).	Surviving rectal cancer at the cost of a colostomy: global survey of long-term health-related quality of life in 10 countries	This was a quantitative study, and ten countries formed an AD hoc collaboration.	2557 patients with permanent colostomy who had undergone rectal cancer surgery from ten countries had a mean time to surgery of 2.5-6.2 (range 1.1-39.2), ages of 49.1-76.1 (range 22-97).	The study collected data using five anchored questions, CI scores, and the EORTC QLQ-C30 scale.	1. Mann–Whitney U test 2. logistic regression analysis
Näsvall, P., Dahlstrand, U., Löwenmark, T., Rutegård, J., Gunnarsson, U., & Strigård, K. (2017).	Quality of life in patients with a permanent stoma after rectal cancer surgery.	The study was a cross-sectional study.	Of 336 patients from Sweden who had undergone surgery for rectal cancer, 336 had a permanent stoma and 117 had no stoma. At 90 months (48-155) after surgery, the median age was 71 (35-97).	Four HRQoL questionnaires were used in the study: EORTC QLQ-C30, EORTC QLQ-CR38, SF-36 and Colostomy Questionnaire (CQ).	1. statistical analysis. 2. Student's t test.
Silva, M. M. R. L., Junior, S. A., de Aguiar Pastore, J., Santos, É. M. M., de Oliveira Ferreira, F.,	Late assessment of quality of life in patients with rectal carcinoma: comparison between sphincter	This study was an observational cross-sectional, comparative quantitative study.	42 ostomy patients. At least 12 months after surgery. The mean age of the group was 64.10±12.54. There were 19 females and 23 males.	Data were collected using the EORTC QLQ-C30 and EORTC QLQ-CR29 questionnaires.	1. descriptive statistics. 2. chi square test. 3. t test. 4. Mann-Whitney U test.

Spencer, R. M. S. B., Calsavara, V. F., Nakagawa, W. T., & Lopes, A. (2018).	preservation and definitive colostomy.				
Tong, G., Zhang, G., Liu, J., Zheng, Z., Chen, Y., Li, M., Zhong, Y., Niu, P., & Xu, X. (2020).	When do defecation function and quality of life recover for patients with non-ostomy and ostomy surgery of rectal cancer?	This was a longitudinal study.	82 ostomy patients. Participants were followed up 2, 3, and 4 years after surgery. Age 64.73±9.05 Male 58 female 24.	The Wexner and EORTC QLQ-CR30 questionnaires were used for data collection.	1. t-test 2. analysis of variance 3.F test 4. CROSSTAB 5. chi-square test
Yan, M. H., Lv, L., Zheng, M. C., Jin, Y., & Zhang, J. E. (2022).	Quality of Life and Its Influencing Factors Among Chinese Patients With Permanent Colostomy in the Early Postoperative Stage: A Longitudinal Study.	The study was a longitudinal design.	A total of 74 patients with permanent colostomy from China were followed up before discharge, one month and three months after discharge, with an age of 57.16±10.28 .27 females (36.5%) and 47 males (63.5%).	1. Demographic data and stoma-related information. 2. QoL questionnaire for people with ostomy-chinese version. 3.The stoma self-efficacy scale. 4.Stoma self-care scale-early stage version.	1.T test. 2. Analysis of variance. 3. Univariate analysis. 4. Multiple linear regression model.
Yang, X., Li, Q., Zhao, H., Li, J., Duan, J., Wang, D., Fang, N., Zhu, P., & Fu, J. (2014).	Quality of life in rectal cancer patients with permanent colostomy in Xi'an	The study was a prospective study.	49 stomostomy patients. The follow-up time was preoperative, one month, three months and six months after surgery. 6 were ≤44 years of age, 43 were all over 45 years of age, 31 were male, and 18 were female.	The EROTC QLQ-C30 and EORTC QLQ-CR38 questionnaires were used to collect data.	1.Descriptive analysis. 2. Repeatable deviation analysis. 3. LSD-t test. 4.Single-sample t-test.

Table 6. The aim and results of the selected studies in the review

Author(s)	Aim	Result
El-Rahman Mohamed, M. A., El-Ata, A. B. A., & Elezaby, H. H. (2022).	The aim of the study was to explore the relationship between resilience and HRQoL in patients with permanent colostomy.	The mean score in the physical domain was 31.30±4.41. The mean score in the psychological domain was 38.14±4.99, while the mean score in the social domain was 31.35±4.92. The mean score of spiritual domain was 28.82±3.07. The mean score of total quality of life scale was 129.61±98.
Feddern, M. L., Emmertsen, K. J., & Laurberg, S. (2015).	The purpose of this study was to investigate the living conditions of permanent colostomy after colorectal cancer surgery.	Age > 80 (p < 0.006) had less effect on quality of life than younger patients.
He, Y., Bian, L.	To study the quality of life of patients with permanent colostomy at different time.	The mean total score of patients with SF36 was 428.38 at 6 months and 489.4 at 12 months after surgery. Postoperative time was an influential factor for quality of life in patients with permanent colostomy (p < 0.05).
Kement, M., Gezen, C., Aydin, H., Haksal, M., Can, U., Aksakal, N., & Öncel, M. (2014).	The aim of the study was to assess the relationship between social image factors and quality of life in patients with permanent ostomy.	SF-36 patients with permanent ostomy had a total physical health score of 48.6±8.5 and a total mental health score of 48.4±10.2. The total physical health score of the normal population was 52.6±8.8, and the total mental health score was 51.7±5.6. Gender on the RP (p = 0.014), GH (p = 0.009), SF (p = 0.018), RE (p = 0.002), MH (p < 0.001), the MCS (p = 0.002). Household of PF (p < 0.001), the RP (p = 0.002), BP (p = 0.006), GH (p = 0.041), RE (p = 0.023), MH (p = 0.008), PCS (p < 0.001). Living area for PF(p < 0.001), The RP (p = 0.003), the BP (p = 0.020), GH (p = 0.021), n (p = 0.003), SF (p = 0.011), RE (p = 0.001), MH (p = 0.004), PCS (p < 0.001), the MCS (p < 0.001).
Kristensen, H. Ø., Thyø, A., Emmertsen, K. J., Smart, N. J., Pinkney, T., Warwick, A. M., Pang, D., Elfeki, H., Shalaby, M., Emile, S. H., Abdelkhalek, M., Zuhdy, M., Poskus, T., Dulskas, A., Horesh, N., Furnée, E. J. B., Verkuijl, S. J., Rama, N. J., Domingos, H., Maciel, J., ...	The objective of the study was to compare generic and stoma-specific health-related quality of life in patients with permanent colostomy across ten countries.	Age (p < 0.001 (95 percent c.i. 1.01 to 1.02), BMI (p=0.039 (95 percent c.i. 1.00 to 1.04)), Unemployment (p < 0.001 (95 percent c.i. 1.98 to 5.09)), single/widowed (p=0.006 (95 percent c.i. 1.08 to 1.58)), Financially burdened (p < 0.001 (95 percent c.i. 1.83 to 3.12)), major CI score (p < 0.001 (95 percent c.i. 2.81 to 4.15)), Time since stoma creation (p=0.003 (95 percent c.i. 0.92 to 0.98)) had an effect on quality of life.

Näsvall, P., Dahlstrand, U., Löwenmark, T., Rutegård, J., Gunnarsson, U., & Strigård, K. (2017).	The aim of this study was to evaluate HRQoL in rectal cancer patients with permanent stoma.	The stomy group is in Mental health ($p = 0.007$), body image ($p < 0.001$), and physical ($p = 0.016$) and emotional function ($P = 0.003$) has a lower score. Score higher in Fatigue ($p = 0.019$) and loss of appetite ($p = 0.027$). Bulge or hernia had influence on PF($P=0.038$) and RP($P=0.033$). CQ: Ostomy had effects on psychological well-being($P=0.002$), pain($P < 0.001$), sexual problems($P=0.004$). functionality of the stoma ($p < 0.001$) was impaired by fear of leakage.
Silva, M. M. R. L., Junior, S. A., de Aguiar Pastore, J., Santos, É. M. M., de Oliveira Ferreira, F., Spencer, R. M. S. B., Calsavara, V. F., Nakagawa, W. T., & Lopes, A. (2018).	The aim of the study was to compare the quality of life of patients with sphincter preservation and those with permanent ostomy.	EROTC QLQ-C30: The ostomy group had higher scores in emotional function 75.0 ($p=0.016$) and cognitive function 91.7 ($p=0.017$). The ostomy group had lower scores on nausea and vomiting 0.0 ($p=0.036$) and constipation 0.0 ($p=0.005$). EROTC QLQ-CR29: The ostomy group had higher scores on dysuria 0.0 ($p=0.033$) and lower scores on buttock pain 0.0 ($p=0.023$), fecal incontinence 0.0 ($p=0.001$), and stool frequency 0.0 ($p=0.001$).
Tong, G., Zhang, G., Liu, J., Zheng, Z., Chen, Y., Li, M., Zhong, Y., Niu, P., & Xu, X. (2020).	The aim of this study was to investigate the bowel function and quality of life in patients with and without stomostomy at different times after surgery.	Postoperative time had significant effects on general QoL ($p=0.002$), dyspnea ($p=0.036$), and financial difficulties ($p < 0.001$).
Yan, M. H., Lv, L., Zheng, M. C., Jin, Y., & Zhang, J. E. (2022).	To investigate the dynamic changes and influencing factors of quality of life in Chinese patients with permanent ostomy.	The postoperative time ($p < 0.01$) had influence on the quality of life. Before discharge: Self-efficacy ($p < 0.05$) has influence on quality of life. One month after discharge: Self-efficacy ($p < 0.01$), Education regarding the operation/truth-telling($p < 0.01$), Average time of ostomy self-care ($p < 0.01$), Communicating with friends who underwent colostomy ($p < 0.01$), Family relationship ($p < 0.01$) had an effect on quality of life. Three months after discharge: Self-efficacy ($p < 0.01$), Body image loss ($p < 0.01$), Participating in activities of patients who underwent colostomy ($p < 0.05$) had an effect on the quality of life.
Yang, X., Li, Q., Zhao, H., Li, J., Duan, J., Wang, D., Fang, N., Zhu, P., & Fu, J. (2014).	The purpose of the study was to observe the quality of life of patients with permanent colon at different periods after surgery.	In addition to constipation ($p=0.59$) and diarrhea ($p=0.33$), postoperative time had an impact on functional aspects ($p < 0.05$), symptom aspects ($p < 0.05$), and Single-item aspects ($p < 0.05$). One month after surgery: With the exception of emotional function, cognitive function, nausea and vomiting, shortness of breath, appetite loss, Symptoms score higher than normal. Three months after surgery: Except cognitive function, shortness of breath, constipation, other functional scores are lower than normal people, symptom scores are higher than normal people. Six months after surgery: role function, nausea and vomiting, appetite loss, constipation, and other

		functional scores were lower than normal people, and symptom scores were higher than normal people.
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Table 7. Tool for Measuring QoL in patients with permanent colostomy

Questionnaire	Developer	Year	Version	dimension	Number of items	Scoring method
European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Core30 EORTC QLQ-C30	Aaronson, N.K. et al.	1993	original (Kristensen et al., 2022), (Näsval et al., 2017), (Silva et al., 2018), (Tong et al., 2020), (Yang et al., 2014)	Five Functional scales (physical, life role, cognitive, emotional, and social functioning); three symptom scales (fatigue, nausea and vomiting, pain); six single-item scales (dyspnea, loss of appetite, insomnia, constipation, diarrhea, and financial difficulties; general QoL health status.	30	The 28 items are graded in four levels, with "Not at all" (1 point), "A little" (2 points), "quite a bit" (3 points), and "Very much" (4 points). The two items are graded in seven levels, with "very poor" (1 point) and "excellent" (7 points), and the scores of all items are converted to a 0-100 scale using linear transformations. The higher the functional score, the higher the QoL, and the higher the symptom score, the lower the QoL.
European Organization for Research and Treatment of Cancer Colorectal Cancer-specific Quality of Life Questionnaire Module (EORTC QLQ-CR38)	Sprangers, M.A. et al.	1999	Original (Näsval et al., 2017)	four functioning scales (body image, future perspectives, sexual functioning and sexual enjoyment) and eight symptom scales (urinary, gastrointestinal, defecation, sexual (male and female), chemotherapy side effects, weight loss and stoma related)	38	The 38 items are graded in four levels, with "Not at all" (1 point), "A little" (2 points), "quite a bit" (3 points), and "Very much" (4 points). The scores for all items are converted to a 0-100 score using linear transformations. The higher the functional score, the higher the QoL, and the higher the symptom score, the lower the QoL.
European Organization for Research and Treatment of Cancer questionnaire module for colorectal cancer (EORTC QLQ-CR29)	Whistance, R.N. et al.	2009	original (Silva et al., 2018)	four scales (urinary frequency, faecal seepage, stool consistency and body image) and 19 single items (urinary incontinence, dysuria, abdominal pain, buttock pain, bloating, dry mouth, hair loss, taste, anxiety, weight, flatulence, fecal incontinence, sore skin,	29	The 29 items are graded in four levels, with "Not at all" (1 point), "A little" (2 points), "quite a bit" (3 points), and "Very much" (4 points). The scores for all items are converted to a 0-100 score using linear transformations. The higher the functional score, the higher the QoL, and the higher the symptom score, the lower the QoL.

				embarrassment, stoma care problems, sexual interest for men, sexual interest for women, impotence, dyspareunia)		
36-item short-form health survey (SF-36)	Stewartse et al.	1988	Chinese version (He et al., 2019)	physical functioning, Role-physical , bodily pain, general health, vitality, social functioning, emotional role and mental health	36	<p>Physical functioning scales: The ten items are graded in three levels: "yes, limited a lot" (1 point), "yes, limited a little" (2 points), "no, not limited at all" (3 points);</p> <p>Role-physical scales: The answers to the three items are yes or no, "yes" (1 point), "No" (2 points);</p> <p>Bodily pain scales: Item 7 is a six-level scale, "none" (6), "Very mild" (5.4), "mild" (4.2), "moderate" (3.1points), "severe" (2.2points), "very severe" (1points). Item 8 was scored in two ways: when answering items 7 and 8, "not at all" (6 or 5 points), "A little bit" (4 points), " moderately" (3 points), " quite a bit" (2 points), " extremely" (1 point); If only item 8 is answered: "not at all" (6 points), "A little bit" (4.75 points), " moderately" (3.5 points), " quite a bit" (2.25 points), " extremely" (1 points).</p> <p>general health scales: All the five items are greded in five levels. Item 1: "Excellent" (5.0 points), "Very good" (4.4 points), "Good" (3.4 points), "Fair" (2.0 points), "Poor" (1.0 points); Items 11a&11c: "Definitely True" (1 points), "Mostly True" (2 points), "Dont know" (3 points), "Mostly False" (4 points), "Definitely False" (5 points); Items 11b&11d: "Definitely True" (5 points),</p>
			Turkish version (Kement et al., 2016)			
			Swedish version (Näsvall et al., 2017)			

					<p>"Mostly True" (4 points), "Dont know" (3 points), "Mostly False" (2 points), "Definitely False" (1 point)</p> <p>Validity scale: All four items are graded in six levels, with two items: "all of the time" (6 points)," most of the time "(5 points)," a good bit of the time "(4 points)," some of the time "(3 points)," a little of the time "(2 points)," none of the time "(1 point); Two projects: "all of the time" (1 point)," most of the time "(2 points)," a good bit of the time "(3 points)," some of the time "(4 points)," a little of the time "(5 points)," none of the time "(6 points)</p> <p>Social functioning scales: Both items are graded in five levels. Item 6: "not at all" (5 points), "slightly" (4 points), "moderately" (3 points), "quite a bit" (2 points), "extremely" (1 point); Item 10: "all of the time" (1 point), "most of the time" (2 points), "some of the time" (3 points), "a little of the time" (4 points)," none of the time "(5 points).</p> <p>Role emotional scales: The answers to the 3 items are yes or no: "Yes" (1 point), "No" (2 points)</p> <p>mental health:All the five items are graded in six levels: 9b, 9c&9f: "All of the time" (1 point), "Most of the time" (2 points), "A good bit of the time" (3 points), "Some of the time" (4 points), "A little of the time" (5 points), "None of the time" (6 points); 9d&9h: "All of the time" (6 points), "Most of the time" (5 points), "A good bit of the time" (4</p>
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						points), "Some of the time" (3 points), "A little of the time" (2 points), "None of the time" (1 point). The total score of the subscale is converted to a score of 0-100 using the following formula: $\{(actual\ raw\ score - lowest\ possible\ raw\ score) / possible\ raw\ score\ range\} \times 100$.
City of Hope Quality of Life Ostomy (COH-QoL-Ostomy) questionnaire	Marcia Grant et al.	2004	Arabic version (El-Rahman Mohamed et al., 2022b)	physical(1-11), psychological(12-24), social(25-36),spiritual(37-43)	43	All items graded in 11 levels, with 0 being the worst and 10 being the best. 1-12, 15, 18-19, 22-30, 32-34, and 37 are reverse-coded, with 0 representing the best and 10 representing the worst. The total score is the sum of the scores for all the items.
Stoma quality of life(Stoma QOL)	Luis Prieto et al.	2005	Chinese version (Yan et al., 2022)	the stoma burden,soial relationship, stoma anxiety, and daily routine)	20	All items are graded in four levels, with "Always" (1 point), "Sometimes" (2 points), "Rarely" (3 points) and "Never" (4 points). The total score is the sum of the scores for all items and ranges from 20 to 80, with the higher the score the better the quality of life.

Table 8. QoL scores in patients with permanent colostomy

Questionnaire	Articles	Measuring time	Patients	Scores
SF36	(He et al., 2019)	Six months, twelve months after surgery.	Quantity: 110, male71, female39 Age: 15 were ≤45 years old, 41 were 46-59 years old, and 54 were ≥60 years old	428.38 at 6 months, 489.4 at 12 months after surgery.
	(Kement et al., 2016)	At least six months after surgery	Quantity: 44,male26, female18 age: 56.6±12.8 (28-76)	575
	(Näsvall et al., 2017)	90 months after surgery (48-155)	Quantity : 336 Age : 71 (35-97)	530.8
EORTC QLQ-C30	(Kristensen et al., 2022)	2.5-6.2 years after surgery (1.1-39.2)	Quantity : 2557 Age : 49.1-76.1 (22-97)	68.94 (58.3-80.4)
	(Näsvall et al., 2017)	91 months after surgery (48-155)	Quantity : 336 Age : 71 (35-97)	65.9
	(Silva et al., 2018)	At least 12 months after surgery	Quantity : 42, male23, female19 Age: 64.10±12.54	75
	(Tong et al., 2020)	2, 3, 4 years after surgery	Quantity: 82, male58, female24 age: 64.73±9.05	66.67 at 2 months, 65.47 at 3 months and 78.57 at 4 months
	(Yang et al., 2014)	Before surgery, one month after surgery, three months after surgery, six months after surgery	Quantity: 49,male31, female18 age: Six patients were aged ≤44, and 43 patients were aged > 45	Preoperative 71.77, one month after surgery 28.70, three months after surgery 54.42, six months after surgery 74.21
EORTC QLQ-CR38	(Näsvall et al., 2017)	90 months after surgery (48-155)	Quantity : 336 age: 71 (35-97)	Function 300.8, symptom: micturitionproblems24.9, malesexualproblems54.0, femalesexualproblems25.6, weight loss8.5
EORTC QLQ-CR29	(Silva et al., 2018)	At least 12 months after surgery	Quantity: 42, male23, female19 age: 64.10±12.54	Function 286.1, symptom 175
City of Hope Quality of Life Ostomy (COH-QoL-Ostomy) questionnaire	(El-Rahman Mohamed et al., 2022b)	At least 3 months after surgery	Quantity: 158, male78, female80 age: 58.2±8.70	129.61±98

Stoma-QOL	(Yan et al., 2022)	Before discharge, one month after discharge, and three months after discharge	Quantity: 74, male47, female27 age: 57.16 ± 10.28	46.01 before discharge, 50.72 one month after discharge, and 63.85 three months after discharge
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Table 9. Influencing factors of QoL in patients with permanent colostomy

Category	Influencing factors	Articles	Statistical value
Demographic factor	Age	(Feddern et al., 2015), (Kristensen et al., 2022)	$p < 0.006$, (OR=1.02, 95% c.i.(1.01,1.02), $p < 0.001$)
	Sex	(Kement et al., 2016)	$p=0.002$
	Living situation	(Kement et al., 2016)	$p < 0.001$
	Living area	(Kement et al., 2016)	$p < 0.001$
	BMI	(Kristensen et al., 2022)	OR= 1.02, 95% c.i.(1.00,1.04), $p=0.039$
	Employment status	(Kristensen et al., 2022)	OR=3.17, 95% c.i.(1.98,5.09), $p < 0.001$
	Spouse or not	(Kristensen et al., 2022)	OR=1.31, 95% c.i.(1.08,1.58), $p=0.006$
	Financial burden	(Kristensen et al., 2022)	OR=2.39, 95% c.i.(1.83,3.12), $p < 0.001$
Factors related to ostomy	High CI score	(Kristensen et al., 2022)	OR=3.42, 95% c.i. (2.81, 4.15), $p < 0.001$
	Time after surgery	(He et al., 2019)	$p < 0.05$, (OR=0.95,95% c.i.(0.92,0.98), $p=0.003$), $p=0.002$, $p < 0.01$, $p < 0.05$
		(Kristensen et al., 2022)	
		(Tong et al., 2020)	
		(Yan et al., 2022)	
		(Yang et al., 2014)	
	Bulge or hernia	(Näsvall et al., 2017)	$p < 0.05$
	Fear of leakage	(Näsvall et al., 2017)	$p < 0.001$
Time to self-care of the stoma	(Yan et al., 2022)	$\beta=0.365$, $p < 0.01$	
Loss of body image	(Yan et al., 2022)	$\beta=0.151$, $p < 0.01$	
Psychosocial factors	Self-efficacy	(Yan et al., 2022)	before discharge: $\beta=0.479$,one month after discharge: $\beta=0.650$,three months after discharge: $\beta=0.971$, $p < 0.01$
	Truth telling	(Yan et al., 2022)	$\beta=-0.236$, $p < 0.01$
	Communication with patients	(Yan et al., 2022)	$\beta=0.309$, $p < 0.01$

	Family relationship	(Yan et al., 2022)	$\beta=-0.26, p<0.01$
	Participation in patients activities	(Yan et al., 2022)	$\beta=-0.114, p<0.05$