Research Article

Meta-Analysis on the Application Value of Collaborative Nursing in Postcolostomy Nursing of Patients with Colorectal Cancer

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Objective. To systematically evaluate the effect of collaborative nursing on self-care ability of postcolostomy patients with colorectal cancer (CRC). *Methods.* PubMed, Web of Science, Embase, China National Knowledge Infrastructure, and Wanfang databases were searched to collect relevant literatures on randomized controlled trials of postcolostomy patients with CRC. The search period was started from 2010 to 2021. Statistical analysis was performed on the data extracted from the comprehensive meta-analysis with STATA 16.0 analysis software. *Results.* As a result, it was found that the incidence of adverse reactions in the control group was higher than that in the treatment group. Seven studies included the preintervention self-care concept and preintervention self-care skills. Six studies included preintervention self-care responsibility and preintervention exercise of self-care agency (ESCA) scale. In the comparison among the concept of self-care after intervention, self-care skills, self-care responsibility, and ESCA scale, all of them had higher scores in the treatment group than in the control group ($P < 0.05$). It fully explains that collaborative nursing can significantly improve the evaluation indicators of patients' self-care ability and reduce patient complications. *Conclusion.* The application of collaborative nursing in the nursing work of patients with CRC after colostomy can significantly reduce the incidence of adverse nursing reactions.

1. Introduction

In recent years, colorectal cancer (CRC) has become the third most prevalent cancer worldwide. Its incidence and mortality are second only to gastric cancer, esophageal cancer, and primary liver cancer among malignant tumors of the digestive system. It is the fourth leading cause of death caused by cancer. It is reported in the studies that in 2018, there were approximately 1.8 million new CRC cases and 881,000 deaths due to CRC in the whole world [1]. Relevant studies have shown that CRC mortality continues to rise in less-developed countries in Asia, Africa, and Latin America, including China. The nursing work of CRC has also attracted the attention of international and domestic scholars. Risk factors predisposing to CRC include obesity [2, 3], lack of exercises [4, 5], smoking [6, 7], drinking alcohol [8, 9], overeating diets rich in red and processed meat, artificially sweetened foods, and salt, and lack of the intake
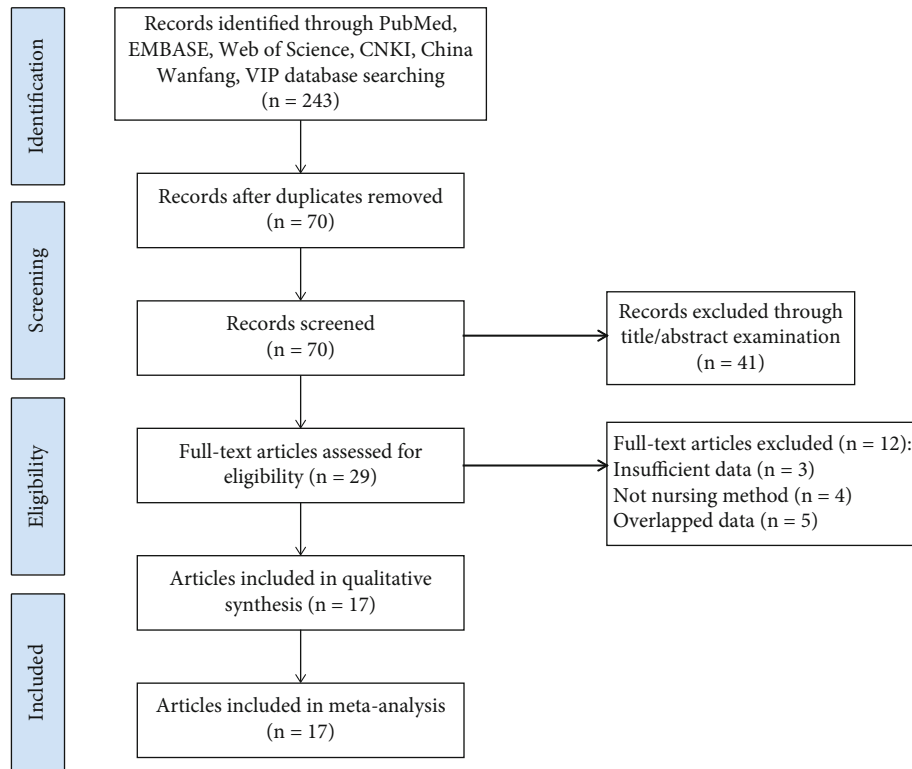
Figure 1: Literature screening flowchart.

of fruits and vegetables [10]. For the treatment of colorectal cancer, some patients are clinically treated with radical resection. The patient's anus and surrounding tissues are removed while the tumor is maximally resected, and the colon is transferred to the abdomen for ostomy [11]. The patient's physical appearance, physiological function, and psychological perception have changed dramatically after ostomy [12]. Effects of cancer treatment in later stage, such as hernias, urinary incontinence, and fistulas, also impose a certain negative psychological burden on patients [13]. Therefore, in order to solve the physical, psychological, and social adaptation, complications, and other needs of patients, the nursing work of patients with CRC ostomy has stricter requirements.

Collaborative nursing is an effective nursing care model. In 1992, Lott proposed the self-care theory centered on patient self-care to give full play to the subjective initiative of patients. It encourages patients and their families to actively participate in self-care, strengthen the collaborative nursing work between patients and nurses, and fully cultivate and mobilize the ability of patients to participate in self-care [14]. Compared with routine nursing, it can meet the needs of nursing work in a more efficient way and improve the quality of nursing services. However, clinically, collaborative nursing is mainly applied to nursing work of patients with chronic obstructive pulmonary disease [15, 16], hemodialysis [17, 18], or epilepsy [19]. There is still no agreement on the effectiveness of collaborative nursing modalities applied to the nursing work of patients with CRC after colostomy. Therefore, this meta-analysis includes

17 randomized controlled studies related to the nursing work of patients with CRC after colostomy and comprehensively analyzed and explored the effect of collaborative care for the patients on patients' self-care ability.

2. Methods

2.1. Literature Research. Two reviewers independently searched PubMed, Web of Science, Embase, China National Knowledge Infrastructure, and Wanfang databases for relevant literature published from 2010 to 2021. The keywords used were as follows: ("#1 Collaborative nursing") and ("#2 colorectal cancer" or "Colon cancer" or "rectal cancer" or "bowel cancer") and ("#3 Colostomy"). References of the included studies were reviewed to find more trials.

2.2. Screening Criteria. Inclusion criteria are as follows. (1) All eligible randomized controlled trials (RCTs) were included, with no language restrictions to reduce the potential for publication bias. (2) Study targets are adult patients diagnosed with CRC who had a colostomy. (3) Intervention measures: patients in the trial were treated with collaborative care management; patients in the control group were treated with routine care management. (4) Outcome measures include at least any one of the following: incidence of adverse reactions (the stoma surrounding skin undergoes edema, erosion, discoloration, tissue hyperplasia, and so on), self-care concept score before and after intervention, self-care skill score before and after intervention, self-care responsibility score before and after intervention, and

TABLE 1: The basic characteristics of inclusion in the literature.

Study	Year	Sample time (year.month)	Cases Con/Treat	Age (years) Treat	Age (years) Con	Sex ratio (male/female) Treat	Sex ratio (male/female) Con	Study design	Outcome measures
Wang and Huang[21]	2020	2018.1-2019.6	44/44	40.1 ± 5.7	40.7 ± 6.4	25/19	26/18	RCT	②③④⑤
Huang and Room [20]	2015	2012.1-2014.6	48/48	18-75	18-75	32/16	33/15	RCT	③⑤⑦⑧⑨
Wang and Lou [22]	2019	2017.2-2018.10	33/33	49.8 ± 5.6	49.3 ± 5.9	18/15	17/16	RCT	①③⑤⑦
Chen et al. [36]	2020	2017.10-2018.10	34/34	58.87 ± 3.05	58.15 ± 2.31	21/13	20/14	RCT	①③⑤⑦
Wang [23]	2019	2017.07-2018.08	38/38	56.62 ± 3.74	55.47 ± 3.61	23/15	21/17	RCT	①②③④⑤⑥⑦
He [24]	2019	2016.04-2018.05	37/37	46.5 ± 2.4	45.9 ± 2.6	22/15	20/17	RCT	①②③④⑤⑥⑦
Xiao [32]	2016	2014.02-2015.02	30/30	38.10 ± 4.02	40.10 ± 4.90	10/20	12/18	RCT	①②③④⑤⑥⑦⑧⑨
Hu [27]	2017	2015.03-2017.01	40/40	61.89 ± 5.95	61.56 ± 5.27	22/18	23/17	RCT	①③⑤⑦
Li and Pang [28]	2020	2018.01-2019.08	30/30	56.18 ± 11.68	57.25 ± 10.85	12/18	14/16	RCT	①②③④⑤⑥⑦
Hu [25]	2017	2016.01-2017.11	15/15	59.8 ± 3.2	60.1 ± 4.1	8/7	10/5	RCT	①③⑤
Si et al. [31]	2019	2017.12~2018.12	40/40	43.76 ± 5.32	43.48 ± 5.16	19/21	21/19	RCT	③⑤
Yuan et al. [35]	2018	2016.01-2017.12	45/45	54-73	54-73	24/21	24/21	RCT	③⑤⑦
Hu et al. [26]	2020	2018.10-2019.10	55/55	48.26 ± 6.38	48.52 ± 6.42	34/21	33/22	RCT	①②③④⑤⑥⑦⑧⑨
Shi [30]	2020	2018.03-2019.03	35/35	40.58 ± 16.04	41.14 ± 13.98	21/14	20/15	RCT	①⑧⑨
Xie and Ran [33]	2019	2017.01-2019.01	43/43	47.28 ± 4.31	47.09 ± 4.28	23/20	26/17	RCT	⑧⑨
Li [29]	2020	2016.01-2018.12	24/24	43-86	43-86	6/18	6/18	RCT	①②③④⑤⑥⑦
Yang et al. [34]	2019	2018.06-2019.06	36/36	63.12 ± 5.12	63.51 ± 4.87	23/13	11/25	RCT	①⑧⑨

Note: Treat: treatment; Con: control; RCT: randomized controlled trial; NR: not reported; ①: adverse effect rate; ②: scores in self-care concept before nursing; ③: scores in self-care concept after nursing; ④: scores in self-care skills before nursing; ⑤: scores in self-care skills after nursing; ⑥: scores in self-care responsibility before nursing; ⑦: scores in self-care responsibility after nursing; ⑧: ESCA score before nursing; ⑨: ESCA score after nursing.

ID Study		OR (95% CI)	Weight %
Wang teng (2019)		0.47 (0.08, 2.75)	3.88
Chen si (2020)		0.14 (0.02, 1.25)	6.01
Wang lei (2019)		0.24 (0.06, 0.96)	9.51
He haiyan (2019)		0.14 (0.02, 1.26)	6.02
Xiao baimin (2016)		0.15 (0.04, 0.59)	12.07
Hu xingyan (2017)		0.15 (0.02, 1.27)	6.04
Li hongjuan (2020)		0.20 (0.04, 1.02)	7.71
Hu caiying (2017)		0.11 (0.01, 1.04)	5.78
Si xuejiao (2019)		0.24 (0.06, 0.96)	9.55
Hu linlin (2020)		0.22 (0.04, 1.10)	7.96
Shi junli (2020)		0.32 (0.09, 1.15)	9.14
Li ying (2020)		0.13 (0.01, 1.18)	5.93
Yang yan (2019)		0.21 (0.05, 0.82)	10.41
Overall (l-squared = 0.0%, p = 0.998)		0.21 (0.13, 0.32)	100.00

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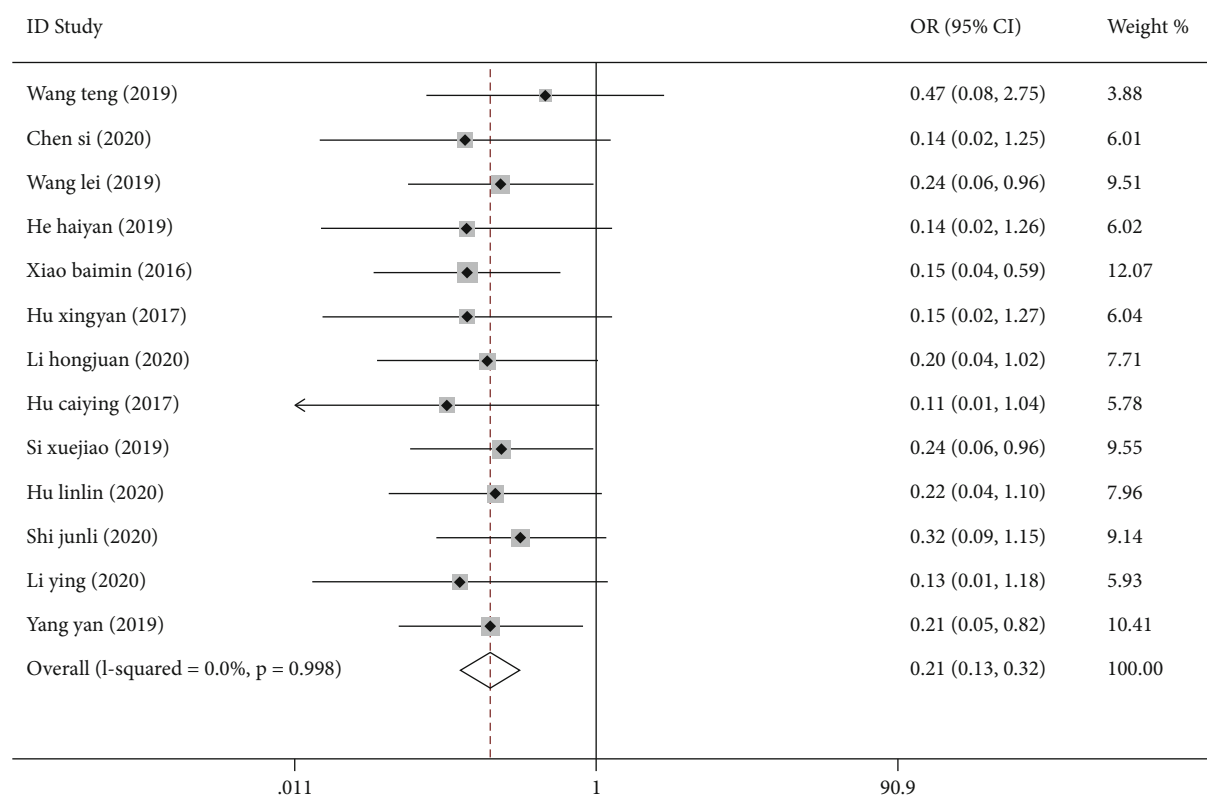
FIGURE 2: The forest plot compares the incidence of adverse reactions to different nursing modalities.

exercise of self-care agency (ESCA) scale score before and after intervention. (5) Randomized controlled studies are included.

Exclusion criteria are as follows: (1) no data required by this meta-analysis are provided, and no results are obtained upon request, as well as the literature in which the original text cannot be obtained; (2) literature with poor quality, missing data, and repeated report; (3) case reports, systematic reviews, and animal experiments.

2.3. Data Extraction. Data were extracted independently by two writers from each included study after retrieval. If no consensus can be reached, the questions will be discussed and the disagreements will be resolved with a third review coordinator.

2.4. Statistical Analysis. Effectiveness was analyzed using a comprehensive meta-analysis, and all data were analyzed with the computer program STATA 16.0 software. Use standard mean difference (SMD) calculation when reporting numeric results. When reporting studies with dichotomous outcomes, odds ratios (ORs) were used to calculate pooled data for effect size and 95% confidence intervals (CI). Since a range of different studies were included, we used the Q-test and the I^2 statistic to test for statistical differences between studies. When $P < 0.05$ and $I^2 > 50\%$, the random-effects model was used to calculate the study results with greater heterogeneity; the fixed-effects model was used for analysis conversely. Publication bias was assessed by examining the funnel plot of the results. Since it is affected by subjective factors, Egger's test and Begg's test were calculated to quantify potential publication bias. The analysis of funnel plot requires sufficient study (≥ 10); otherwise, it defaults to the presence of publication bias. Sensitivity analysis was performed to test the stability of the results of this meta-analysis.

3. Results

3.1. Research Results. Through the keyword combination research, 243 articles were initially retrieved. 70 duplicates are identified and removed. Two writers browsed the abstract, as well as further read the full text. Suitable literature was screened according to the inclusion and exclusion criteria, and 17 studies were finally confirmed [20–36]. See Figure 1 for literature screening process. The included literatures in this study were all Chinese randomized controlled trials, including 1254 patients. In particular, the treatment group and the control group were both consisted of 627 patients. The basic characteristics of the included articles are shown in Table 1.

3.2. Meta-Analysis Results

3.2.1. Adverse Reactions. 13 studies collected data on adverse reactions that may occur during treatment. Since the heterogeneity test results showed that there was no significant heterogeneity in the included studies ($I^2 = 0.00\%$, $P = 0.998$), the fixed-effects model was used. The overall adverse effects
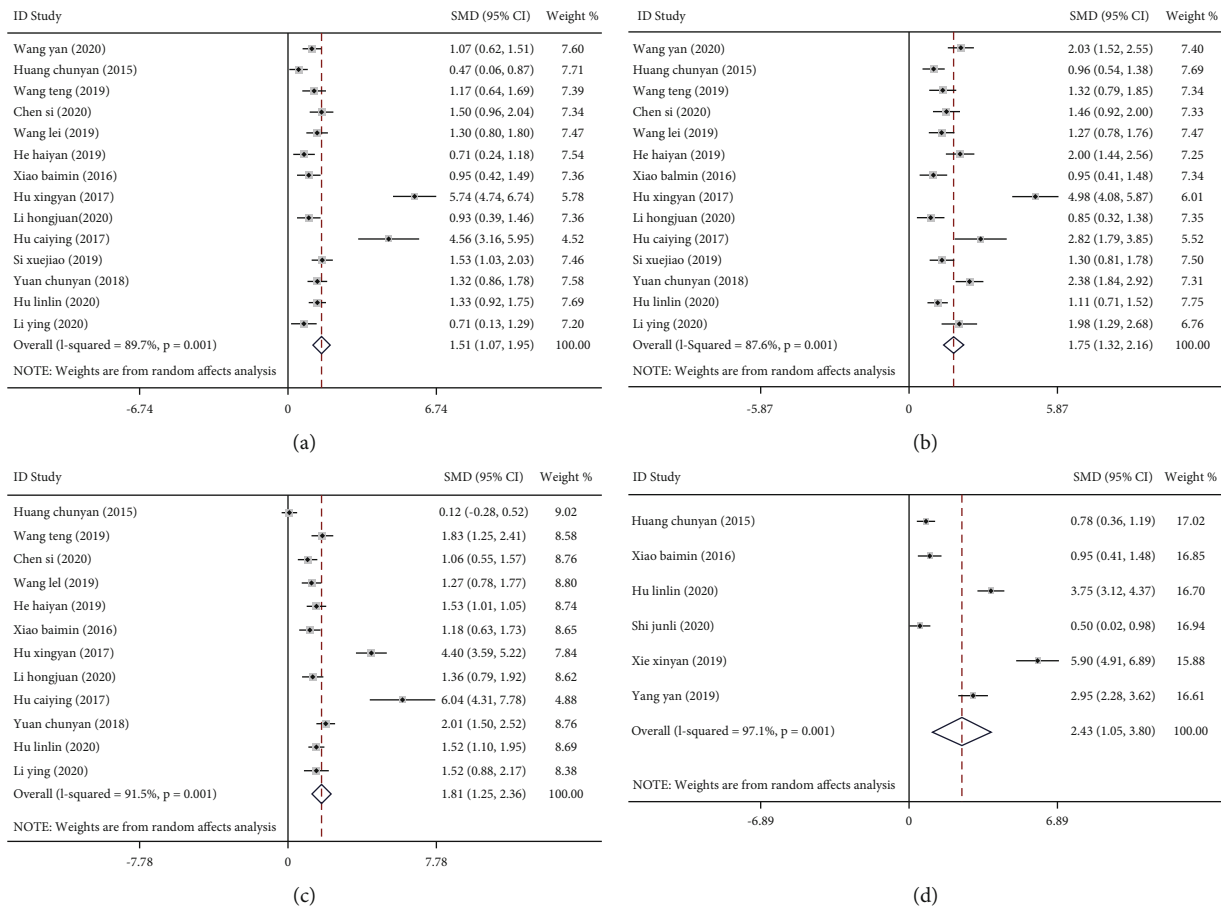
FIGURE 3: Forest plot comparing patients' self-care abilities after different nursing modality interventions: (a) concept of self-care after intervention; (b) self-care skills after intervention; (c) self-care responsibility after intervention; (d) ESCA score after intervention.

of collaborative care were significantly lower compared to usual care (OR = 0.21, 95% CI: (0.13, 0.32), $P < 0.001$) (Figure 2).

3.2.2. Baseline Level. Seven studies included the preintervention self-care concept and self-care skills. Six studies included preintervention self-care responsibility and ESCA scores. Meta-analysis of baseline scores had been done for all studies on collaborative nursing. Since there was no significant heterogeneity in the results of these four baseline scores, the fixed-effects model was used for comprehensive analysis. The concept of self-care (Figure S1A), self-care skills (Figure S1B), self-care responsibility (Figure S1C), and ESCA score (Figure S1D) before intervention were not significantly different between the control group. These results prove that there is comparability between the two groups.

3.2.3. Self-Care Ability after Intervention. Evaluate the patient's self-care concept, self-care skills, self-care responsibility, and ESCA score after collaborative nursing. Studies on the results of these four scores all had high heterogeneity ($I^2 > 50.0\%$, $P < 0.05$). Therefore, they all used random-effects model for analysis. Meta-analysis showed the concept of self-care after intervention (14 studies) (SMD = 1.51, 95%

CI: (1.07, 1.95), $I^2 = 89.7\%$) (Figure 3(a)), self-care skills (14 studies) (SMD = 1.75, 95% CI: (1.33, 2.16), $I^2 = 87.6\%$) (Figure 3(b)), self-care responsibility (12 studies) (SMD = 1.81, 95% CI: (1.25, 2.36), $I^2 = 91.5\%$) (Figure 3(c)), and ESCA score (6 studies) (SMD = 2.43, 95% CI: (1.05, 3.81), $I^2 = 97.1\%$) (Figure 3(d)). Among the comparison, the scores of the treatment group were all higher than those of the control group ($P < 0.05$). It fully showed that collaborative care can significantly improve the evaluation indicators of patients' self-care ability.

3.3. Publication Bias. Funnel plots were used to examine possible publication bias for adverse effects (Figure 4(a)), self-care concept after intervention (Figure 4(b)), self-care skills (Figure 4(c)), and self-care responsibility (Figure 4(d)). The funnel plot of all four indicators observed is symmetrically distributed, and there is insufficient evidence for publication bias. Egger's test ($P = 0.054$) and Begg's test ($P = 0.004$) were performed for adverse reactions, indicating a symmetrical distribution without publication bias. The three indicators of Egger's test ($P = 0.001$) and Begg's test ($P = 0.228$) for self-care concept after intervention, Egger's test ($P = 0.002$) and Begg's test ($P = 0.006$) for self-care skills, and Egger's test ($P = 0.002$) and Begg's test
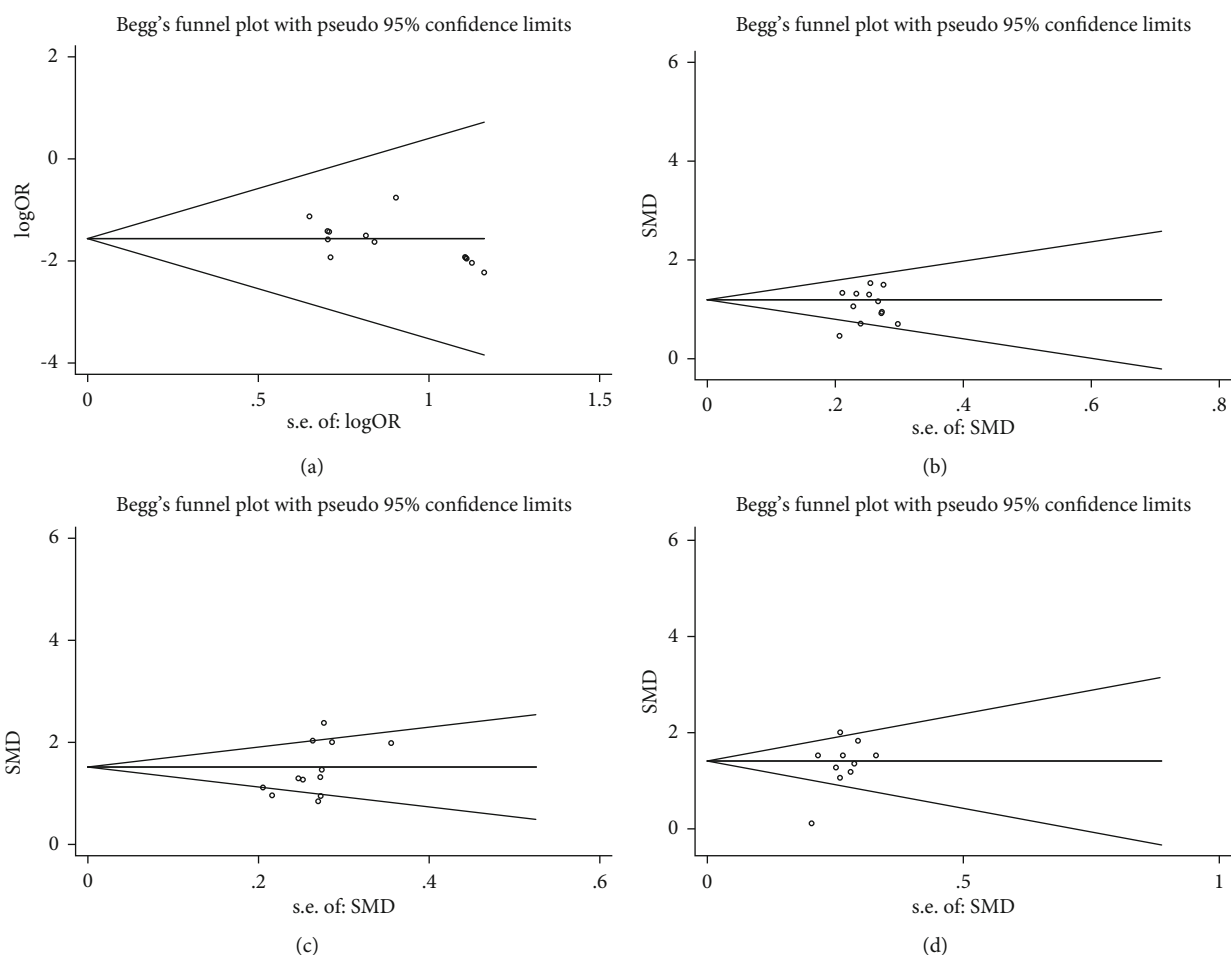
(a)

(b)

(c)

(d)

FIGURE 4: Funnel plot comparing the incidence of adverse reactions (a); self-care concept after intervention (b); self-care skills after intervention (c); self-care responsibility after intervention (d).

($P = 0.064$) for self-care responsibility indicate that there may be some publication bias in the study results.

3.4. Sensitivity Analysis. Sensitivity analysis was performed for the seven indicators of interest in this study. The results show that there was little change between the combined result and the original combined result, and the result of the incidence of adverse nursing reactions in the two groups is OR = 0.21, 95% CI: (0.13, 0.32) (Figure 5(a)). The combined effect of the preintervention self-care concept is SMD = −0.06, 95% CI: (-0.23, 0.11); the combined effect of self-care skills before the intervention is SMD = 0.03, 95% CI: (-0.15, 0.20); the combined result of self-care responsibility before the intervention is SMD = −0.00, 95% CI: (-0.19, 0.19); the complex result of ESCA score before intervention is SMD = −0.04, 95% CI: (-0.21, 0.14); self-care concept after invention is SMD = 1.51, 95% CI: (1.07, 1.95) (Figure 5(b)), self-care skills (SMD = 1.75, 95% CI: (1.33, 2.16)) (Figure 5(c)), self-care responsibility (SMD = 1.81, 95% CI: (1.25, 2.36)) (Figure 5(d)), and ESCA score (SMD = 2.43, 95% CI: (1.05, 3.81)) (Figure 5(e)). There is no change in the combined result from the original combined result. Therefore, the sensitivity shown is low, and the results of this meta-analysis are credible.

4. Discussion

In recent years, the incidence of CRC in China is increasing year by year, while low CRC accounts for about 70% to 80% [37], ultralow rectal cancer, in the other words, CRC with lower margin < 5 cm from anal margin. Such patients can only undergo abdominoperineal resection. At the same time, permanent enterostomy can bring serious adverse effects on the patient's physical, psychological, and social adaptability. At present, there are more than 1 million patients with enterostomy in China. About 100,000 new cases of enterostomy surgery are confirmed each year, and it is still growing in trend [38]. Due to the lack of knowledge of stoma care and psychological acceptance of patients, it is easy to cause complications such as stoma ulcers and stoma hernias. With the annual increase in healthcare costs, medical costs, and the need for clinical nursing work after CRC ostomy, some related studies have proposed efficient new nursing model, that is, collaborative nursing model. It is aimed at reducing the occurrence of complications and increasing the quality of patients' daily life.

17 studies are included in this meta-analysis. The results of 13 studies indicate a significant reduction in overall adverse effects of collaborative nursing. The collaborative
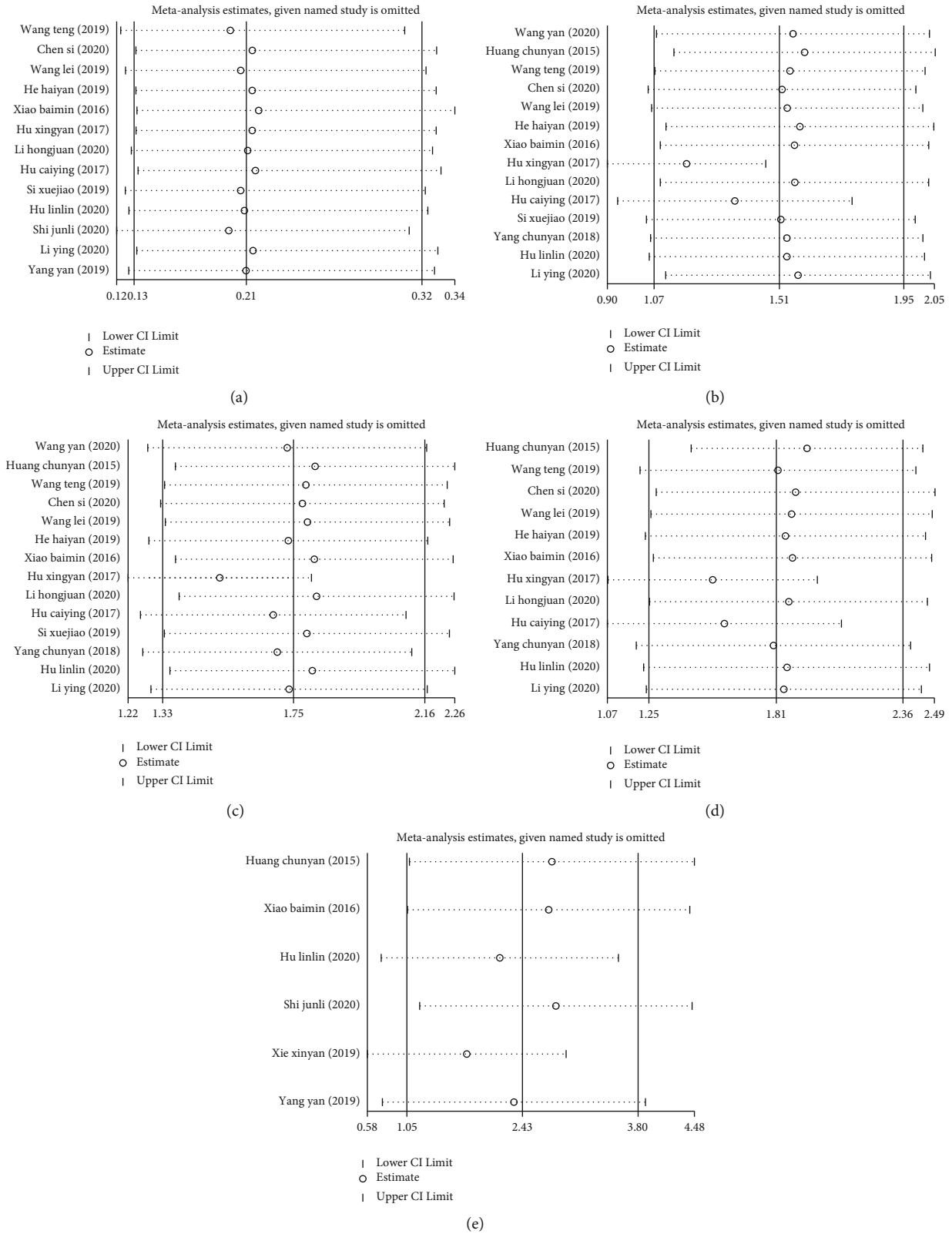
Figure 5: The sensitivity analysis chart for the incidence of adverse reactions and the self-care abilities: (a) incidence of adverse reactions; (b) self-care concept; (c) self-care skills; (d) self-care responsibility; (e) ESCA scores.

nursing model can reduce the incidence of adverse reactions after CRC ostomy. 14 studies incorporated the postintervention self-care concept and preintervention self-care skills. 12 studies included postintervention self-care responsibility, and 6 studies included postintervention ESCA scores. The results indicate that collaborative nursing can significantly improve the evaluation indicators of various self-care abilities of patients, strengthening their self-care abilities. ESCA, developed on the basis of Orem's self-care theory, has been found to have high reliability and validity in several international studies [39]. Liu et al. [40] showed that patients with peptic ulcer had significantly higher ESCA scores and enhanced self-care after informational health education and continuous care intervention. This is similar to the results of the present study. It has been confirmed that collaborative nursing has a positive impact on patients to actively and cooperatively participate in nursing work and promote the recovery of their own physical and mental health and also social adaptation status [41]. Therefore, a good collaborative nursing model should be established between nurses and patients. First of all, the nursing staff establishes a good nurse-patient relationship with the patients through good communication and mutual trust. Subsequently, the nursing staff promotes correct disease-related understanding to patients through health education, knowledge popularization, and behavioral guidance so that patients can understand the relevant knowledge after CRC ostomy and assists them to improve their self-care ability and sense of responsibility, enhancing the patients' self-care ability in daily life to promote early postoperative recovery and reduce the occurrence of complications and the incidence of adverse reactions. In this way, patients can recover to normal state as soon as possible from aspects of physical, psychological, and social adaptation. It plays an active role in assisting the treatment and prevention of CRC attacks.

The meta-analysis had some limitations; only 17 studies were included, resulting in a small sample size of included studies; and all of them were in Chinese literature, and there may be some selection bias in the study results.

In conclusion, comparing with routine nursing, the application of collaborative nursing in the nursing work of patients with CRC after colostomy can significantly reduce the incidence of adverse nursing reactions and chances of having complications. At the same time, it can improve the evaluation indicators of various self-care abilities such as self-care concept, self-care skills, self-care responsibility, and ESCA score before intervention and strengthen the self-care ability of patients.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

Pingyu Yang and Rongfang Shan contributed equally.

Acknowledgments

Supplementary Materials

Supplementary Figure 1: forest plot of baseline levels of each indicator (A: concept of self-care before intervention; B: self-care skills before intervention; C: self-care responsibility before intervention; D: ESCA score before intervention). *(Supplementary Materials)*

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