Original Article

The application effects of personalized nursing on the perioperative period of hepatobiliary surgery: a systematic review and meta-analysis

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Background: Nursing during the perioperative period of hepatobiliary surgery is essential in the treatment and rehabilitation of patients. Personalized nursing gives full consideration to the personal characteristics of patients and encourages patients to participate in making decisions. However, compared to traditional nursing, there is insufficient evidence of the effectiveness of personalized nursing. This review sought to evaluate the effects of personalized nursing during the perioperative period of hepatobiliary surgery.

Methods: A meta-analysis was conducted of articles published from 2010 to 2021. To identify the relevant electronic publications, the PubMed, Web of Science, Embase, CNKI, and Wanfang databases were searched for articles comparing the clinical efficacy of personalized nursing with that of traditional nursing. The standardized mean difference (SMD) and odds ratio (OR) with 95% confidence interval (CI) were used to calculate the aggregated effect index.

Results: Of the 286 records retrieved from the search of the databases, 12 studies, comprising 1,039 patients, met the screening criteria. The meta-analysis showed that personalized nursing improved patients' levels of satisfaction with nursing (OR =6.871; 95% CI: 3.708–12.734), and decreased the incidence of adverse reactions significantly (OR =0.234; 95% CI: 0.153–0.357). Compared to traditional nursing, personalized nursing reduced patients' average hospitalization time, the time it took to get out of bed for the first time after surgery, the time it took to first eat after surgery, and the time it took to first exhaust after surgery. Additionally, patients who received personalized nursing had significantly reduced Self-rating Anxiety Scale (SAS) scores and Self-rating Depression Scale (SDS) scores than patients who received traditional nursing.

Discussion: The application of personalized nursing to patients undergoing hepatobiliary surgery during the perioperative period improved patients' level of satisfaction with nursing, effectively reduced the incidence of adverse reactions, accelerated the recovery of hepatobiliary function after surgery, and relieved anxiety and depression; thus, personalized nursing is worthy of clinical application.

Keywords: Hepatobiliary surgery; perioperative period; personalized nursing; mental state; postoperative recovery

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Introduction

Hepatobiliary disease, including viral hepatitis, fatty liver, cholecystitis, and cholelithiasis, is characterized by a rapid onset and development with a critical condition, and is a common chronic disease in clinical surgery (1). The clinical efficacy of hepatobiliary surgery has been greatly improved in the past 10 years, which has an incidence rate of 14.5% now (2). Additionally, due to more advanced preoperative imaging, improved extra-operative care, progressive surgical techniques, a better understanding of anatomy, technological advancements in intraoperative instruments, the early identification of disease and complication management, the postoperative mortality of hepatobiliary surgery has reduced from 20% to 3% (3). However, hepatobiliary surgery is a complex operation and has a high postoperative morbidity.

Infectious complications are one of the main causes of death. According to statistics from large studies and national databases, the incidence of concurrent surgical infections is 9.9–23% (4-6). A research (7) showed that the worsening of an infection at a surgical site can extend the hospitalization tine to 10.6 days and cost an additional US$20,842, suggesting postoperative infections increased hospitalization time, resource utilization, and readmission rates, and placed considerable economic burdens on hospitals and patients. Reasonable rehabilitation nursing plays an important role in accelerating the prognosis of patients.

Personalized nursing is a new model of nursing. In terms of nursing care, it emphasizes patient-centered services to reduce or block patients' physiological stress responses during the operation via multidisciplinary cooperation in nursing, anesthesia, and nutrition, and ultimately promotes postoperative recovery (8). Unlike traditional disease-centered nursing, personalized nursing comprehensively considers all aspects of nursing, including patients' personal needs, values, and preferences, and encourages patients to actively participate in making decisions to achieve goals (9). Previous studies have shown that there is a positive correlation between the application of personalized nursing and better nursing quality and recovery, and that personalized nursing increases patients' levels of satisfaction with nursing, and their initiative and life quality (10). In addition, related studies have shown that personalized nursing can shorten hospitalization time without increasing medical expenditure (11). The benefits of personalized nursing for professionals include improved motivation and job satisfaction (12). However, no consensus on the effectiveness of personalized nursing in clinical settings has yet been reached. This meta-analysis sought to collect the current evidence on the application effects of personalized nursing on hepatobiliary surgery, and evaluate the effectiveness of personalized nursing during the perioperative period in hepatobiliary surgery.

We present the following article in accordance with the PRISMA reporting checklist (available at https://dx.doi.org/10.21037/apm-21-1923).

Methods

This study conducted a systematic review and meta-analysis of randomized controlled trials (RCTs). As this study was a literature study, patient consent and approval from an ethics committee were not required.

Literature search

The publication period was set from 2010 to 2021. Electronic databases, including the PubMed, Web of Science, Embase, CNKI, and Wanfang databases, were searched. We also reviewed the references of articles and previously related systematic reviews to find other studies. For each database, the search criteria were customized. The keywords for the searches were a combination of Medical Subject Headings (MESH) and the following entry terms: "Personalized nursing", "Hepatobiliary surgery", and "Perioperative period".

Inclusion criteria

Articles were included in the meta-analysis if they met the following inclusion criteria: (I) the study examined hepatobiliary surgery nursing during the perioperative period; (II) the participants were in the perioperative period of hepatobiliary surgery; (III) different interventions were used to nurse the patients (i.e., traditional nursing and personalized nursing); (IV) the main results included any one of the following items: patients' level of satisfaction after nursing, the incidence of adverse reactions (infection, thrombosis, bleeding, dizziness, and vomiting), postoperative recovery indicators (average hospitalization time, the time it took to get out of bed for the first time after surgery, the time it took to first eat after surgery, and the time it took to first exhaust after surgery), and patients' level of anxiety and depression [Self-rating Anxiety Scale (SAS) and Self-rating Depression Scale (SDS) scores after nursing]; and (V) to

ensure the evidence was of a high level, the study had to be a RCT or a selected article in the same disease field that had recently been published in an authoritative journal.

Exclusion criteria

Articles were excluded from the meta-analysis if: (I) the article failed to meet the inclusion criteria; (II) the article was obsolete; and/or (III) the research findings detailed in the article had been published previously.

Research selection and data extraction

The articles were screened and selected by 2 team members independently. All search records were imported into EndNote X9 to avoid to duplication. To further evaluate the eligibility of some studies, the full texts were obtained and disagreements were discussed with a 3rd member. Information about the author, publication year, trial time, sample size, age, and gender of the participants, study type, and outcome indicators were extracted from the included articles.

Data analysis

Stata 16.0 (meta package) was used for the meta-analysis. When studying the clinical effects of different types of nursing, the standardized mean difference (SMD) or odds ratio (OR) with a 95% confidence interval (CI) was used to present the data. I^2 and Q tests were used to detect the level of heterogeneity. An I^2>50% or a P<0.05 was considered to indicate significant heterogeneity. If there was significant heterogeneity, a fixed-effects model was applied to calculate the pooled effect size; otherwise, a random-effects model was used. A P value <0.05 was considered statistically significant.

Sensitivity analysis

To perform the sensitivity analysis, all the studies included were deleted 1 by 1 in this meta-analysis to confirm whether these studies were significantly affected by any individual study.

Results

Literature screening

In the final screening, a total of 286 records were identified from the electronic database. After deleting duplicate and obviously irrelevant studies, and excluding 34 studies by reading titles and abstracts, the full text of 20 articles were read to further evaluate the articles (see *Figure 1*). In the end, a total of 12 studies (13-24), comprising 1,039 hepatobiliary patients in the perioperative, period, were included in this systematic review. There were 520 patients in the treatment group and 519 patients in the control group.

Research characteristics

The number of participants in each study ranged from 70 to 115. The duration of the interventions ranged from 1 to 2 years and 10 months. There was no significant difference in the baseline data of the patients in terms of age and gender between the treatment group and the control group. This study only included RCTs. The main characteristics of the included studies are set out in *Table 1*.

Data analysis

Eight indicators that frequently appeared in the literature were selected for the meta-analysis. Patients' level of satisfaction post-nursing and the incidence of adverse reactions were the main clinical indicators. The secondary outcome indicators were the postoperative recovery indicators (i.e., average hospitalization time, the time it took to get out of bed for the first time after surgery, the time it took to first eat after surgery, and the time it took to first exhaust after surgery), and patients' levels of anxiety and depression (i.e., SAS and SDS scores after nursing).

Indicators of application effect

Seven studies reported on patients' level of post-nursing satisfaction for the treatment group and the control group. Ten studies reported on the incidence of adverse reactions. The results of the meta-analysis of patients' level of post-nursing satisfaction and the incidence of adverse reactions are shown in *Figure 2A*,*2B*. A heterogeneity analysis was performed, and it was reported that neither the heterogeneity of patients' level of satisfaction with nursing (I^2=0.0%; P=0.811, fixed-effects model) nor the heterogeneity of the incidence of adverse reactions (I^2=0.0%; P=0.999; fixed-effects model) were significantly different. Compared to traditional nursing, patients who received personalized nursing had significantly higher levels of satisfaction (OR =6.871; 95% CI: 3.708–12.734), and the incidence of adverse reactions was distinctly

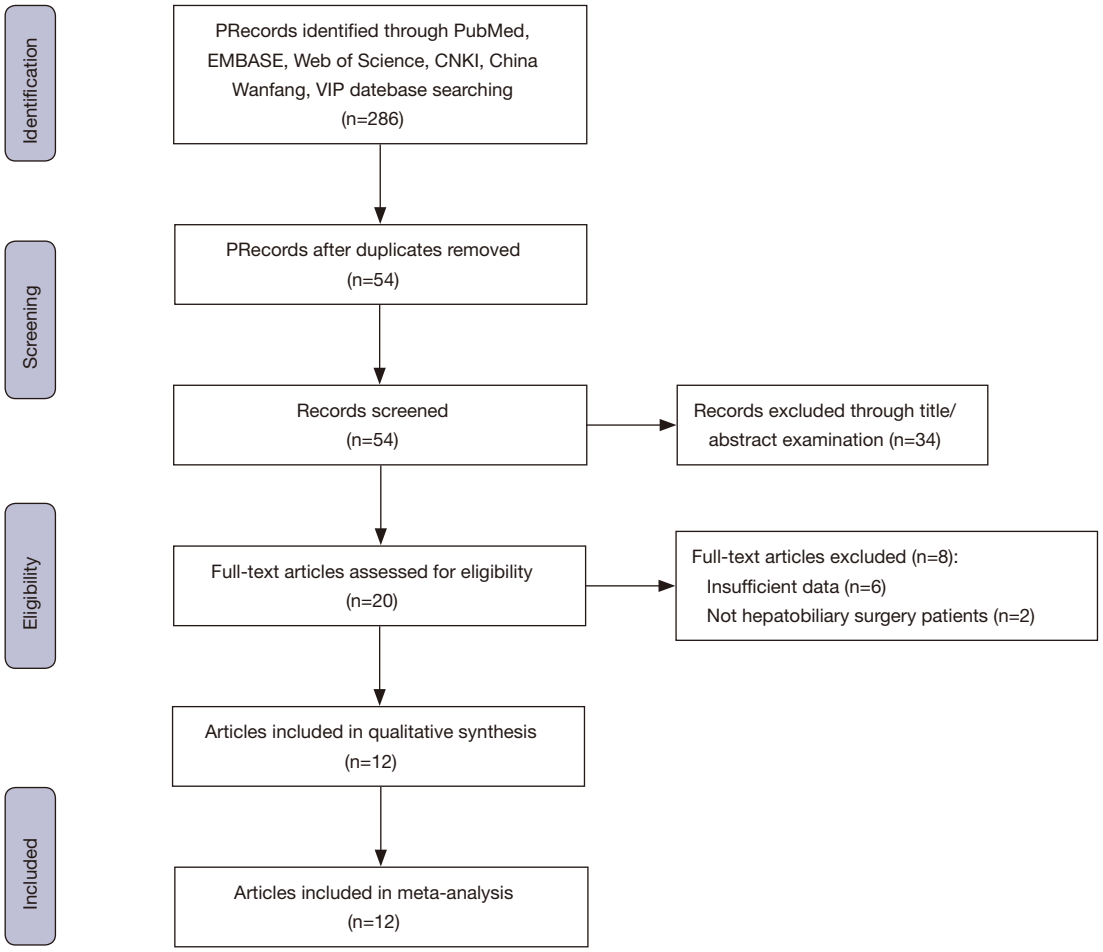

Figure 1 Flow chart of article screening.

lower (OR =0.234; 95% CI: 0.153–0.357). To further confirm the stability of the results of the 2 indicators, a sensitivity analysis was performed. After deleting the included articles 1 by 1, the confidence intervals of the effect values of patients' post-nursing levels of satisfaction (see *Figure 3A*) and the incidence of adverse reactions (see *Figure 3B*) fluctuated in a small arrangement around the pooled effect size, indicating that the results were stable.

Postoperative recovery indicators

Postoperative recovery comprised the following 4 aspects: (I) average hospitalization time; (II) the time it took to get out of bed for the first time after surgery; (III) the time it took to first eat after surgery; and (IV) the time it took to first exhaust after surgery. 10 studies reported data on the average hospitalization time and the time it took to get out of bed for the first time after surgery. The heterogeneity analysis indicated that the heterogeneity of the average hospitalization time (I^2=86.7%; P<0.001, random-effects model) was significantly distinct from the time it took to get out of bed for the first time after surgery (I^2=59.6%; P=0.008; random-effects model). After personalized nursing, the average hospitalization time and the time it took to get out of bed for the first time after surgery were significantly reduced. Specifically, the average hospitalization time was shortened by 2.763 days (SMD =–2.763; 95% CI: –3.269–2.257; see *Figure 4A*), and the time it took to get out of bed for the first time after surgery was shortened by 1.868 days (SMD =–1.868; 95% CI: –2.120–-1.617; see *Figure 4B*).

9 studies reported data on the time it took to first eat after surgery and the time it took to first exhaust after surgery. The heterogeneity analysis showed that the heterogeneity of the time it took to first eat after surgery (I^2=41.0%; P=0.094, fixed-effects model) and time it took

Table 1 The basic details of the included articles

Study	Year	Sample time	Cases treat/con	Age (years)		Sex ratio (M/F)		Study design	Outcome measures
				Treat	Con	Treat	Con		
Ge Lulu	2016	Jan 2013 to Apr 2015	43/43	48.3±8.9	47.8±9.2	30/13	31/12	RCT	①②③④⑤⑥⑦⑧
Zhang Chunyuan	2016	May 2013 to Apr 2015	43/43	48.3±8.9	47.8±9.2	33/10	29/14	RCT	①③④⑤⑥⑦⑧
Huo Xiaoyan	2017	Jul 2015 to Aug 2016	54/54	50.8±7.5	50.3±7.6	35/19	32/22	RCT	②③④⑤⑥⑦⑧
Shan Haixia	2017	Mar 2014 to Mar 2016	37/38	46.1±8.5	45.1±7.5	20/17	21/17	RCT	①②③④⑤⑥⑦⑧
Zheng Jiaxin	2019	Apr 2017 to Jul 2018	58/57	44.9±3.4	44.9±3.4	32/26	33/24	RCT	①②③④⑤⑥⑦⑧
Li Teng	2016	Jul 2011 to Jul 2012	48/48	25–57	25–58	NP	NP	RCT	②③④⑤⑥⑦⑧
Liao Chunmei	2014	Jun 2011 to Apr 2013	40/40	47.2±3.5	48.0±2.6	27/13	29/11	RCT	①②⑦⑧
Liu Hui	2015	Oct 2013 to Dec 2014	38/37	43.1±11.5	43.1±11.5	21/17	20/17	RCT	①②⑦⑧
Zhang Limin	2017	May 2013 to Mar 2016	38/38	48.5±8.6	48.6±8.2	28/10	26/12	RCT	②③④⑤⑥⑦⑧
Chen Yanjie	2019	Jan 2018 to Dec 2018	43/43	53.7±9.5	55.9±9.6	22/21	24/16	RCT	②③④⑤⑥⑦⑧
Zhou Chunmei	2020	May 2018 to Sep 2019	43/43	54.8±6.3	54.8±6.3	28/15	27/16	RCT	①②③④⑦⑧
Shen Yanlibg	2020	Feb 2018 to Jan 2019	35/35	43.7±7.0	45.6±7.9	21/14	20/15	RCT	②③④⑤⑥⑦⑧

① : post-nursing level of satisfaction; ② : incidence of adverse reactions; ③ : hospitalization time; ④ : the time it took to get out of bed for the first time after surgery; ⑤ : the time it took to first eat after surgery; ⑥ : the time it took to first exhaust after surgery; ⑦ : SAS score after nursing; ⑧ : SDS score after nursing. Treat, Treatment group; Con, Control group; M, male; FM, female; NP, not reported; RCT, randomized controlled trial.

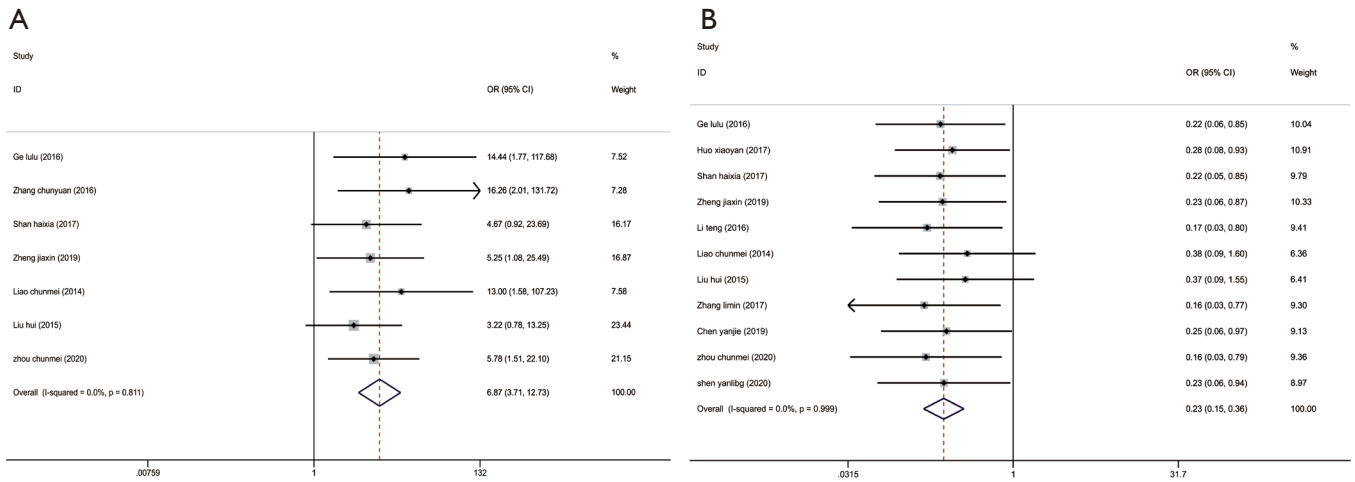

Figure 2 Forest chart of the application effect of the 2 groups. (A) Forest chart of post-nursing level of satisfaction; (B) forest chart of the incidence of adverse reactions.

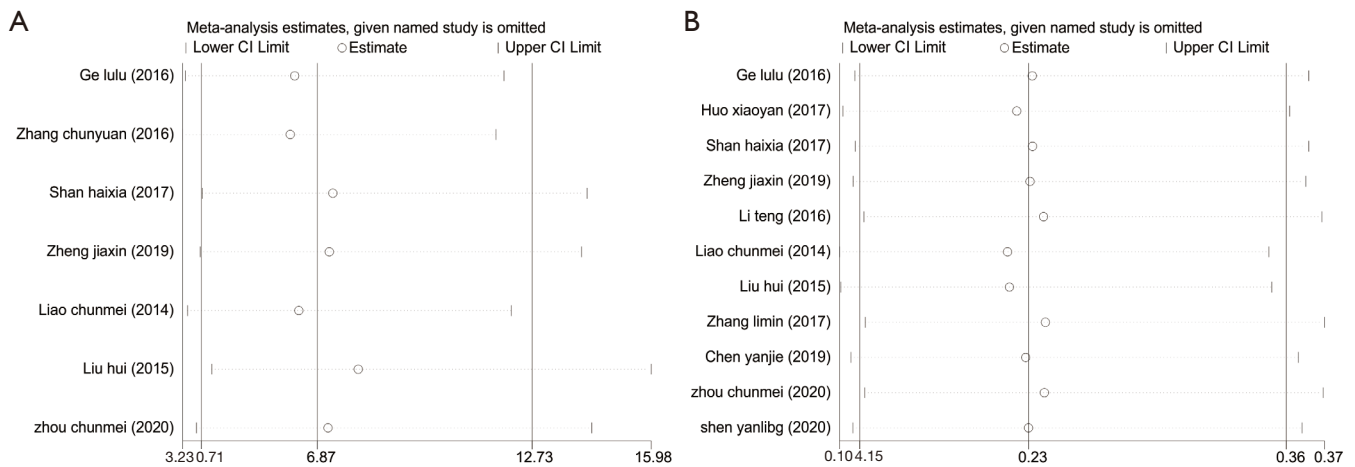

Figure 3 Sensitivity analysis of the application effect of the 2 groups. (A) Sensitivity analysis graph of post-nursing level of satisfaction; (B) sensitivity analysis graph of the incidence of adverse reactions.

to first exhaust after surgery (I^2=6.2%; P=0.384, fixed-effects model) had no significant difference. The results in relation to the time it took to first eat after surgery and the time it took to first exhaust after surgery for patients who received personalized nursing were better than those for patients who received traditional nursing. Specifically, the time it took to first eat after surgery was shortened by 1.507 days (SMD =–1.507; 95% CI: –1.665–-1.349; see *Figure 4C*), and the time it took to first exhaust after surgery was shortened by 1.648 days (SMD =–1.648; 95% CI: –1.810–-1.487; see *Figure 4D*). The results of the sensitivity analysis showed that after excluding the included articles 1 by 1, the pooled effect size and CI of the average hospitalization time (see *Figure 5A*), the time it took to get out of bed for the first time after surgery (see *Figure 5B*), the time it took to first eat after surgery (see *Figure 5C*), and the time it took to first exhaust after surgery (see *Figure 5D*) did not change significantly, suggesting that the meta-analysis was stable.

Anxiety and depression indicators of patients

The 12 included articles used post-nursing SAS and SDS scores to assess patients' anxiety and depression levels. The results of the heterogeneity analysis showed that

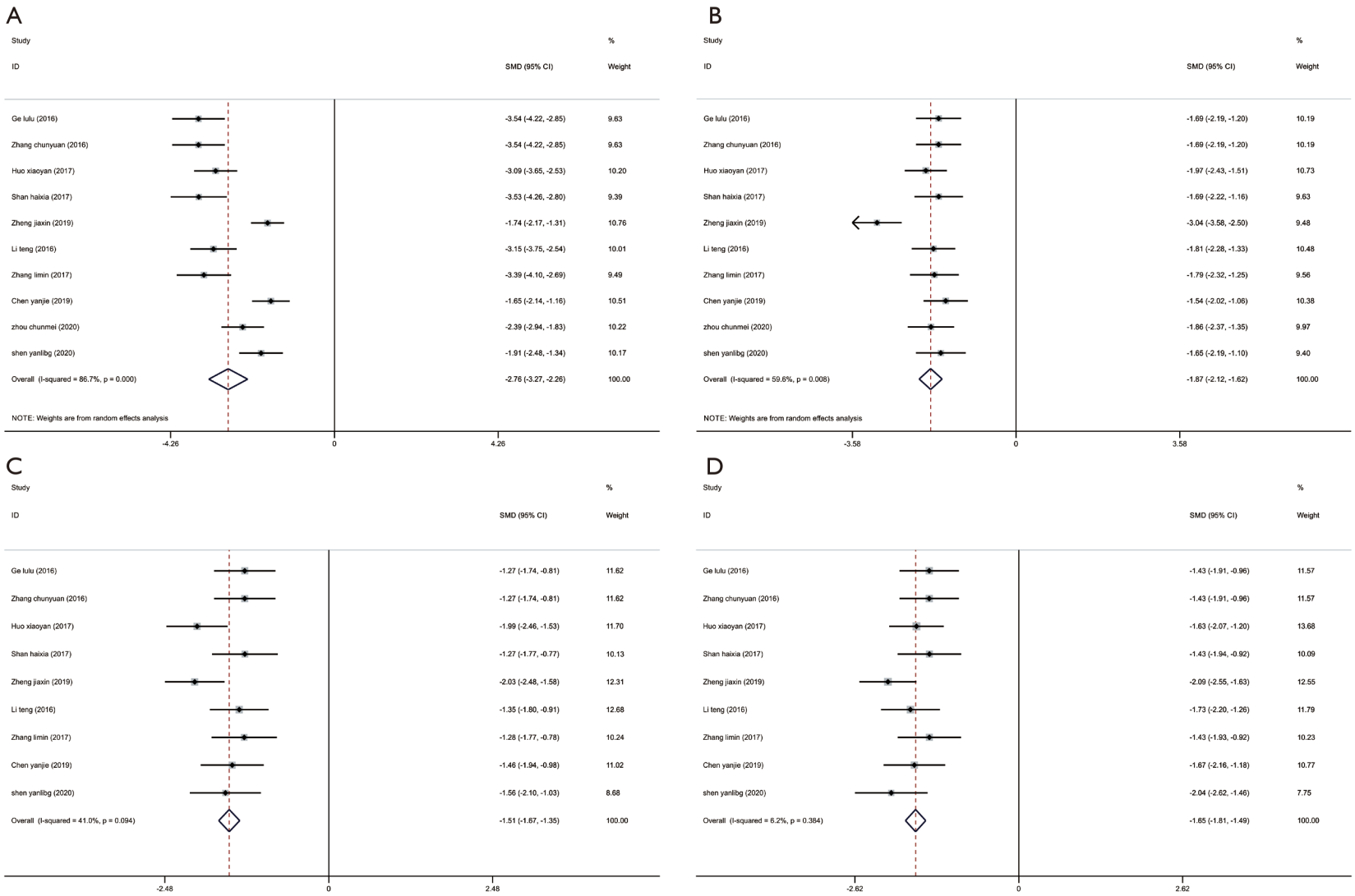

Figure 4 Forest plot of postoperative recovery indicators of the 2 groups. (A) Forest plot of average hospitalization time; (B) forest plot of the time it took to get out of bed for the first time after surgery; (C) forest plot of the time it took to first eat after surgery; (D) forest plot of the time it took to first exhaust after surgery.

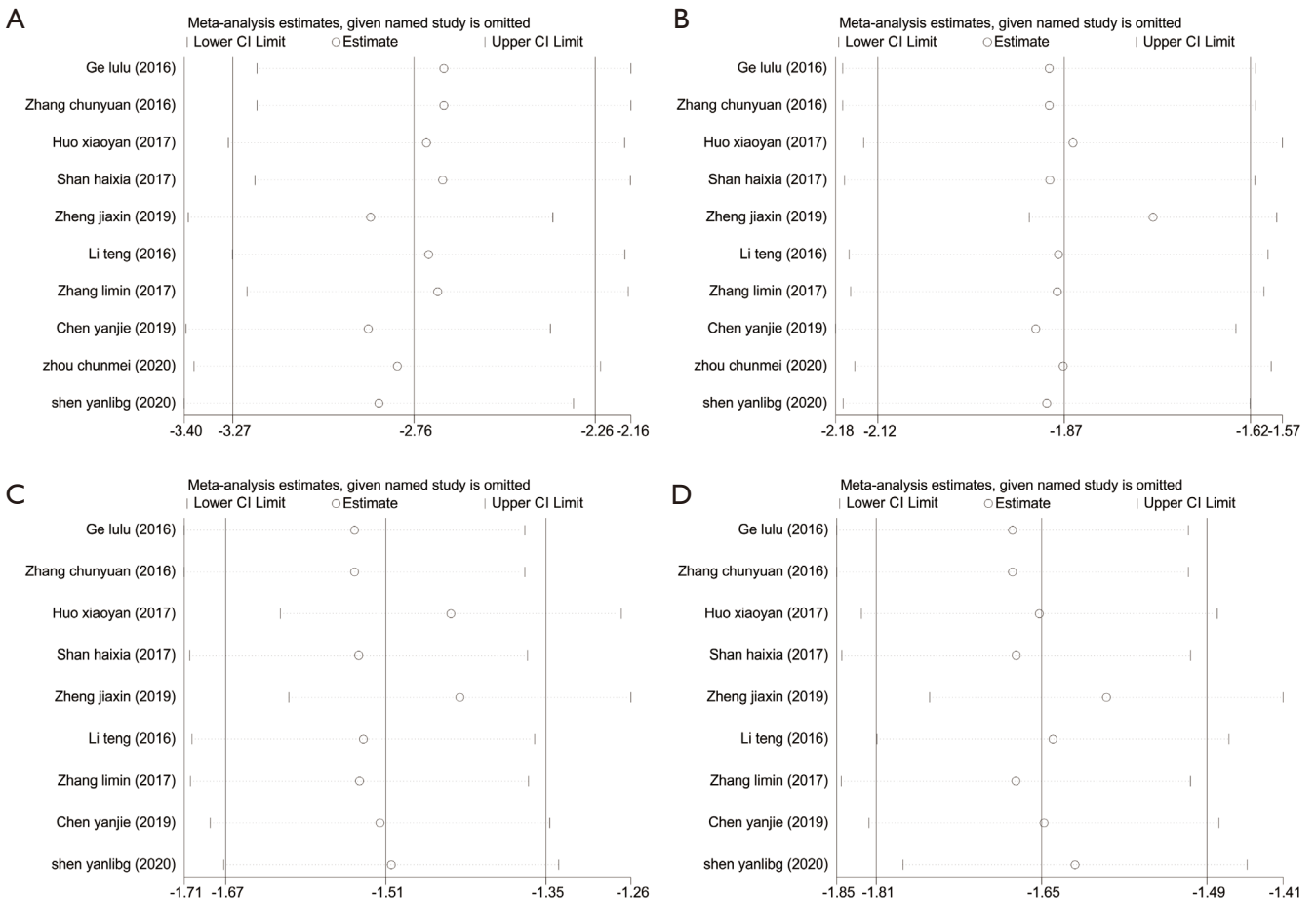

Figure 5 Sensitivity analysis of postoperative recovery indicators of the 2 groups. (A) Sensitivity analysis graph of the average hospitalization time; (B) sensitivity analysis graph of the time it took to get out of bed for the first time after surgery; (C) sensitivity analysis graph of the time it took to first eat after surgery; (D) sensitivity analysis graph of the time it took to first exhaust after surgery.

the heterogeneity of the SAS score (I^2=96.2%; P<0.001, random-effects model) based on these 12 studies was not significant, while the heterogeneity of SDS score (I^2=93.2%; P<0.001; random-effects model) was significant. The results of the meta-analysis showed that compared to patients who received traditional nursing, the SAS and SDS scores of patients who received personalized nursing were reduced. Specifically, patients' SAS score after personalized nursing was reduced by 3.241 points (SMD =−3.241; 95% CI: −4.141−−2.341; *Figure 6A*), and their SAS score was decreased by 3.007 points (SMD =−3.007; 95% CI: −3.677−−2.338; *Figure 6B*). The sensitivity analysis showed that the pooled effect size and CI of patients' SAS score (see *Figure 7A*) and SDS score (see *Figure 7B*) after personalized nursing did not fluctuate significantly, suggesting that the meta-analysis was stable.

Discussion

Our systematic review included 12 related articles on the effects of personalized nursing during the perioperative period of hepatobiliary surgery. Unlike previous reviews in this field, this review not only explored the clinical efficacy of personalized nursing in the perioperative period and the postoperative recovery of patients, but also examined patients' psychological status.

According to the results of this meta-analysis, personalized nursing improved patients' level of satisfaction. The level of nursing satisfaction of the treatment group was between 92.11–97.67%, while that of the control group was between 74.42–78.38%. An analysis of the factors affecting patients' levels satisfaction also showed that personalized nursing strengthened the communication between nurses

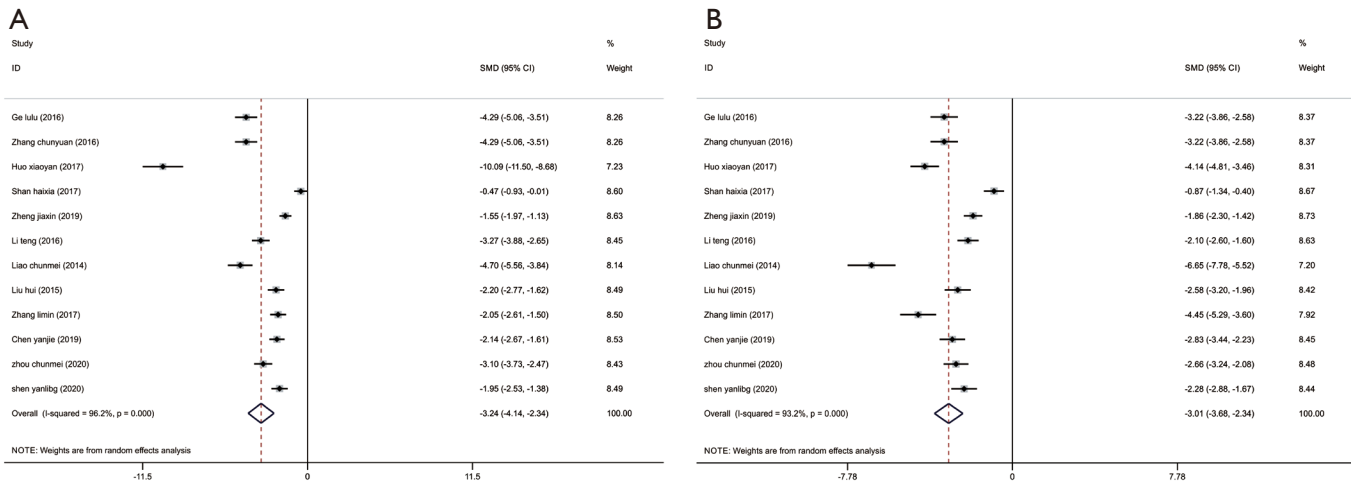

Figure 6 Forest plot of anxiety and depression indicators of the 2 groups. (A) Forest plot of Self-rating Anxiety Scale (SAS) score after personalized nursing; (B) forest plot of Self-rating Depression Scale (SDS) score after personalized nursing.

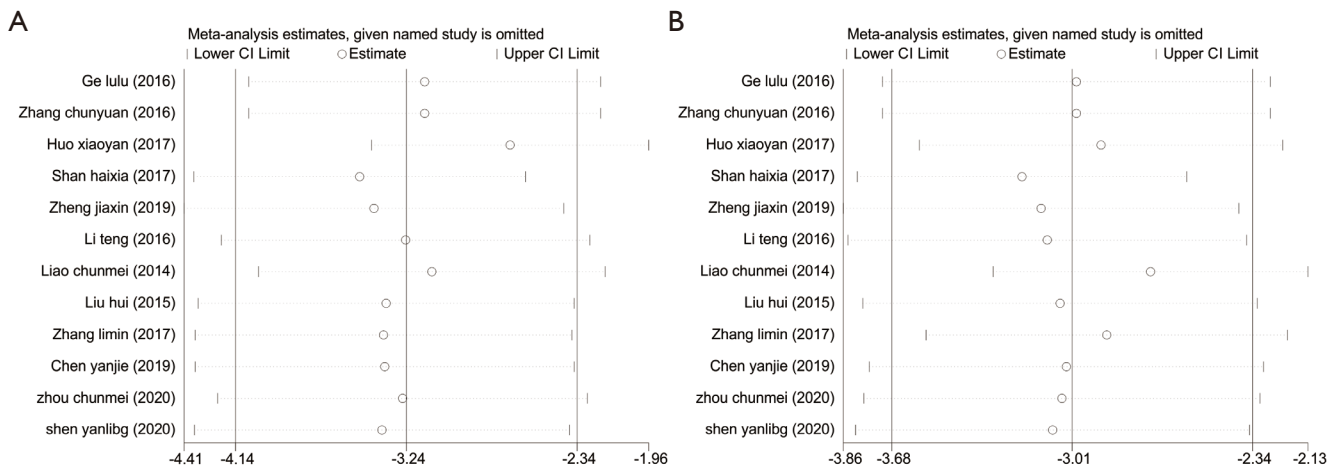

Figure 7 Sensitivity analysis graph of anxiety and depression indexes of the 2 groups of patients. (A) Sensitivity analysis graph of Self-rating Anxiety Scale (SAS) score after personalized nursing; (B) sensitivity analysis graph of Self-rating Depression Scale (SDS) score after personalized nursing.

and patients and provided patients with required decision-making information (25). Additionally, hospitalization time had a significant effect on patients' levels of satisfaction with nursing. The longer patients stayed in hospital, the more satisfied they were with the nursing (26). Continuous personalized nursing made patients believe that their individuality was truly recognized and considered.

Personalized nursing also reduced the incidence of adverse reactions. The incidence of adverse reactions in the treatment group was 4.64–8.57%, while the incidence in the control group was 23.25–28.57%. Patients' postoperative recovery improved significantly. Clinical curative and prognostic indicators, including the average hospitalization time, the time it took to get out of bed for the first time after surgery, the time it took to first eat after surgery, and time it took to first exhaust after surgery were all notably shortened. As part of the process of personalized nursing, nurses formulate personalized health care plans, and determine the best treatment and nursing method by cooperating and exchanging opinions with patients and doctors (27).

The results of the 12 studies also indicated that personalized nursing has potential benefits for the anxiety and depression of patients in the perioperative period of

hepatobiliary surgery. It may be that personalized nursing expands patients' disease-related knowledge and nursing skills, thereby enhancing their confidence in nursing and alleviating their negative emotions of anxiety and depression (28).

This systematic review emphasized the clinical efficacy and postoperative recovery effects of personalized nursing, but also examined the anxiety and depression of these patients. In addition, this analysis only included RCTs with rigorous designs to ensure that the quality of the data was relatively high. However, this review had some limitations. First, personalized nursing is not clearly defined, the content and degree of personalized nursing vary greatly, and the tools for measuring outcome variables are also diverse. Second, some indicators of the included studies were significantly heterogeneous. Due to the limited number of studies, it was not possible to conduct further subgroup analyses to investigate the potential confounding factors of studies with high heterogeneity.

In short, the application of personalized nursing to patients undergoing hepatobiliary surgery during the perioperative period improved patients' levels of satisfaction with nursing, effectively reduced the incidence of adverse reactions, accelerated the recovery of hepatobiliary function after surgery, and relieved anxiety and depression. Thus, it is worthy of clinical application, and should be adopted in clinical settings in the future to promote treatment and recovery.

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Footnote

Reporting Checklist: The authors have completed the PRISMA reporting checklist. Available at https://dx.doi.org/10.21037/apm-21-1923

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://dx.doi.org/10.21037/apm-21-1923). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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