ISSN 1948-9366 (online)

World Journal of *Gastrointestinal Surgery*

World J Gastrointest Surg 2024 December 27; 16(12): 3643-3906

Published by Baishideng Publishing Group Inc

World Journal of Gastrointestinal Surgery

Contents

Monthly Volume 16 Number 12 December 27, 2024

EDITORIAL

MINIREVIEWS

ORIGINAL ARTICLE

Case Control Study

Retrospective Cohort Study

Retrospective Study

World Journal of Gastrointestinal Surgery

Monthly Volume 16 Number 12 December 27, 2024

Contents

World Journal of Gastrointestinal Surgery

Monthly Volume 16 Number 12 December 27, 2024

Contents

World Journal of Gastrointestinal Surgery

Monthly Volume 16 Number 12 December 27, 2024

Contents

ABOUT COVER

Editorial Board Member of *World Journal of Gastrointestinal Surgery*, Roberto Peltrini, MD, PhD, Surgeon, Research Fellow, Academic Research, Department of Public Health, University of Naples Federico II, Via Pansini 5, Naples 80131, Italy. roberto.peltrini@gmail.com

AIMS AND SCOPE

The primary aim of *World Journal of Gastrointestinal Surgery* (*WJGS*, *World J Gastrointest Surg*) is to provide scholars and readers from various fields of gastrointestinal surgery with a platform to publish high-quality basic and clinical research articles and communicate their research findings online.

WJGS mainly publishes articles reporting research results and findings obtained in the field of gastrointestinal surgery and covering a wide range of topics including biliary tract surgical procedures, biliopancreatic diversion, colectomy, esophagectomy, esophagostomy, pancreas transplantation, and pancreatectomy, *etc*.

INDEXING/ABSTRACTING

The *WJGS* is now abstracted and indexed in Science Citation Index Expanded (SCIE, also known as SciSearch®), Current Contents/Clinical Medicine, Journal Citation Reports/Science Edition, PubMed, PubMed Central, Reference Citation Analysis, China Science and Technology Journal Database, and Superstar Journals Database. The 2024 Edition of Journal Citation Reports® cites the 2023 journal impact factor (JIF) for *WJGS* as 1.8; JIF without journal self cites: 1.7; 5-year JIF: 1.9; JIF Rank: 126/292 in surgery; JIF Quartile: Q2; and 5-year JIF Quartile: Q3.

RESPONSIBLE EDITORS FOR THIS ISSUE

NAME OF JOURNAL
World Journal of Gastrointestinal Surgery

ISSN
ISSN 1948-9366 (online)

LAUNCH DATE
November 30, 2009

FREQUENCY
Monthly

EDITORS-IN-CHIEF
Peter Schemmer

EDITORIAL BOARD MEMBERS
https://www.wjgnet.com/1948-9366/editorialboard.htm

PUBLICATION DATE
December 27, 2024

INSTRUCTIONS TO AUTHORS
https://www.wjgnet.com/bpg/gerinfo/204

GUIDELINES FOR ETHICS DOCUMENTS
https://www.wjgnet.com/bpg/GerInfo/287

GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH
https://www.wjgnet.com/bpg/gerinfo/240

PUBLICATION ETHICS
https://www.wjgnet.com/bpg/GerInfo/288

PUBLICATION MISCONDUCT
https://www.wjgnet.com/bpg/gerinfo/208

ARTICLE PROCESSING CHARGE
https://www.wjgnet.com/bpg/gerinfo/242

STEPS FOR SUBMITTING MANUSCRIPTS
https://www.wjgnet.com/bpg/GerInfo/239

ONLINE SUBMISSION
https://www.f6publishing.com

World Journal of Gastrointestinal Surgery

Submit a Manuscript: https://www.f6publishing.com

World J Gastrointest Surg 2024 December 27; 16(12): 3764-3771

DOI: 10.4240/wjgs.v16.i12.3764

ISSN 1948-9366 (online)

ORIGINAL ARTICLE

Retrospective Study

Intraoperative thermostatic nursing and failure mode and effects analysis enhance gastrectomies' care quality

Xian-Yong Wang, Yi-Lei Zhao, Sha-Sha Wen, Xiao-Yu Song, Lu Mo, Zhi-Wei Xiao

Specialty type: Gastroenterology and hepatology

Provenance and peer review: Unsolicited article; Externally peer reviewed.

Peer-review model: Single blind

Peer-review report's classification

Scientific Quality: Grade B, Grade C

Novelty: Grade B, Grade C

Creativity or Innovation: Grade B, Grade C

Scientific Significance: Grade B, Grade C

P-Reviewer: Ahn SH; Takahashi T

Received: September 12, 2024

Revised: October 12, 2024

Accepted: October 22, 2024

Published online: December 27, 2024

Processing time: 76 Days and 1.4 Hours

Xian-Yong Wang, Yi-Lei Zhao, Xiao-Yu Song, Lu Mo, Zhi-Wei Xiao, Operating Room, Affiliated Hospital of Southwest Medical University, Luzhou 646000, Sichuan Province, China

Sha-Sha Wen, Department of Psychosomatic Medicine, Affiliated Hospital of Southwest Medical University, Luzhou 646000, Sichuan Province, China

Corresponding author: Yi-Lei Zhao, MMed, Nurse, Operating Room, Affiliated Hospital of Southwest Medical University, No. 25 Taiping Street, Jiangyang District, Luzhou 646000, Sichuan Province, China. zy18281101220@yeah.net

Abstract

BACKGROUND

Utilizing failure mode and effects analysis (FMEA) in operating room nursing provides valuable insights for the care of patients undergoing radical gastric cancer surgery.

AIM

To evaluate the impact of FMEA on the risk of adverse events and nursing-care quality in patients undergoing radical surgery.

METHODS

Among 230 patients receiving radical cancer surgery between May 2019 and May 2024, 115 were assigned to a control group that received standard intraoperative thermoregulation, while the observation group benefited from FMEA-modeled operating room care. Clinical indicators, stress responses, postoperative gastrointestinal function recovery, nursing quality, and the incidence of adverse events were compared between the two groups.

RESULTS

Significant differences were observed in bed and hospital stay durations between the groups ($P < 0.05$). There were no significant differences in intraoperative blood loss or postoperative body temperature ($P > 0.05$). Stress scores improved in both groups post-nursing ($P < 0.05$), with the observation group showing lower stress scores than the control group ($P < 0.05$). Gastrointestinal function recovery and nursing quality scores also differed significantly ($P < 0.05$). Additionally, the incidence of adverse events such as stress injuries and surgical infections varied notably between the groups ($P < 0.05$).

CONCLUSION
Incorporating FMEA into operating room nursing significantly enhances patient care by improving safety, expediting recovery, and reducing healthcare-associated risks.

Key Words: Constant temperature nursing; Failure mode and effects analysis model; Operating room nursing; Radical gastric cancer; Nursing quality

Core Tip: Reasonable and effective nursing interventions can markedly enhance the quality of care for surgical patients, reduce the risk of adverse events, and improve anesthesia recovery, postoperative gastrointestinal function, and overall postoperative outcomes. These interventions are particularly beneficial in alleviating traumatic stress responses in patients undergoing radical gastric cancer surgery.

Citation: Wang XY, Zhao YL, Wen SS, Song XY, Mo L, Xiao ZW. Intraoperative thermostatic nursing and failure mode and effects analysis enhance gastrectomies' care quality. *World J Gastrointest Surg* 2024; 16(12): 3764-3771
URL: https://www.wjgnet.com/1948-9366/full/v16/i12/3764.htm
DOI: https://dx.doi.org/10.4240/wjgs.v16.i12.3764

INTRODUCTION

Gastric cancer ranks among the most prevalent cancers globally, with a 5-year relative survival rate of only about 20%. It occurs more than twice as often in men than in women and is especially common in East Asia, particularly in China[1]. Early-stage gastric cancer often lacks specific symptoms, though some patients may experience precursors such as heartburn and indigestion. As the disease progresses, symptoms like upper abdominal pain, anemia, and anorexia emerge, intensifying to include severe abdominal pain, hematemesis, and melena in the late stages. Recent advancements in medical technology have improved outcomes through comprehensive treatment programs, yet radical resection remains a key therapeutic approach. Despite its efficacy in removing cancerous tissue, radical gastrectomy is complex and often requires multiple abdominal washes during surgery, contributing to potential complications like intraoperative hypothermia[2]. Intraoperative hypothermia, defined as a core body temperature below 36 °C, can compromise surgical safety[3]. Operating room nursing, which encompasses various supportive tasks to ensure patient safety during surgery, is crucial for patients undergoing radical gastric cancer surgery. While standard operating room care provides some clinical benefits, it falls short in mitigating intraoperative hypothermia. Intraoperative constant temperature nursing addresses this by tailoring insulation and heating strategies to the patient's needs to maintain thermal stability. However, this approach alone, with its focus solely on patient condition without comprehensive risk assessment, often fails to prevent potential risks effectively and does not sufficiently reduce adverse events or enhance nursing quality[4]. Failure mode and effects analysis (FMEA) is a quality control methodology that involves routine failure mode analysis, risk prediction, and the implementation of effective improvement measures to enhance care quality. Reports on the application of FMEA in operating room nursing are limited. This study aims to explore the effectiveness of combining intraoperative thermostatic nursing with FMEA-modeled operating room nursing in managing patients undergoing radical gastric cancer surgery, examining a sample of 230 such patients.

MATERIALS AND METHODS

Methods

In a study involving 230 patients undergoing radical cancer surgery between May 2019 and May 2024, we employed simple randomization and maintained blinding of the patients. The control group received intraoperative constant temperature nursing, while the observation group was managed with operating room care under the FMEA mode. We compared clinical indicators, stress response, postoperative gastrointestinal function recovery, nursing quality, and the occurrence of adverse events between the groups.

The specific measures included: (1) Thermal insulation care: (a) Preoperative: Prior to entry, nursing staff prepared the incubator with liquids at 37 °C, controlled the operating room temperature and humidity at 22 °C and 50%, respectively, checked the patient's body temperature, and minimized skin disinfection time while ensuring patient insulation in the non-surgical areas; (b) Intraoperative: An inflatable warming blanket was used to cover the non-operative areas of the patient, maintaining a temperature of 40 °C until the end of the procedure, and intraoperative fluids were warmed to 37 °C; and (c) Postoperative: After the procedure, patients were covered and transferred to a warmed observation room maintained at 25 °C; (2) Heating and nursing care: A resistance heating blanket was laid flat on the operating bed, focusing on the contact areas with the patient's skin. Body temperature was closely monitored, and heating was adjusted

if the core body temperature exceeded 37 °C or dipped below 36 °C, with the infusion tube maintained at 37 °C; and (3) Temperature monitoring: Body temperature was monitored every 5 min. If the temperature fell below 36 °C more than three times, the operating room temperature was increased, and the frequency of temperature checks was adjusted to every 2 minutes until stability was achieved. If temperatures exceeded 37 °C three times, the heating was reduced and more of the patient's skin was exposed to air.

For the observation group under the FMEA model, the measures were as follows: (1) Workflow: Before the study commenced, team meetings were held to determine the workflow through brainstorming, data collection, and risk assessment processes with the aim of developing corrective measures; (2) Establish an operating room nursing team under the FMEA model: The team, led by the head nurse and comprising responsible nurses and clinicians, reviewed past adverse events in gastric radical resection, identifying characteristics and preventive measures; (3) Data collection: Team members mastered the relevant knowledge of FMEA theory and radical gastric cancer; (4) Process confirmation and risk assessment. Team members held regular meetings to observe preoperative preparations, the potential individual risks affecting the operation process, and formulate targeted nursing measures for the identified risks; (5) Risk analysis. Team members drew a brief surgical flow chart, including a preoperative visit assessment, patient transport safety assessment, and postoperative transport safety assessment; (6) Evaluation results. According to the operational flow chart, the failure modes were numbered and scored using the FMEA scoring criteria. The risk priority number (RPN) was calculated based on frequency, detectability, and severity, using the formula RPN = frequency × detectability × severity. A higher RPN value indicated a greater safety hazard. Measures were prioritized based on the three highest RPN values, addressing issues such as prolonged operation time, intraoperative infection, and unreasonable positioning; and (7) Formulate corrective measures. Discussed the top three items with the highest RPN values, identifying the cause of each potential failure mode, and developed corrective actions: (a) Long operation time. Reason analysis: Nursing staff are not sufficiently familiar with the GC procedure; Countermeasures: "old with new" mode; (b) Intraoperative infection. Reason analysis: Nursing staff have a limited understanding of aseptic techniques, there is poor personnel management, and antibiotics are used inappropriately; Countermeasures: Nursing staff must strictly adhere to aseptic operating room protocols, use prophylactic antibiotics as prescribed by doctors, control the number of personnel in the operating room, and enhance environmental monitoring; and (c) Improper positioning. Cause analysis: Cushion positioning and injury prevention measures are not standardized; Countermeasures: Nursing staff should rigorously follow established guidelines tailored to patient-specific needs, with particular attention to areas susceptible to stress injuries.

Observational indicators

(1) Clinical indicators: These include measurements such as postoperative body temperature and length of hospital stay; (2) Stress response: Measured using the posttraumatic stress disorder checklist, this scale assesses increased vigilance (5 items), avoidance behaviors (8 items), and repetitive responses to trauma (5 items) across three dimensions. Each item is scored from 1 to 5, with a total possible score ranging from 17 to 85. A score above the cut-off value of 17 indicates a stress response, with higher scores reflecting more severe stress; (3) Recovery of gastrointestinal function; (4) Nursing quality: Evaluated at the conclusion of nursing care using a hospital-developed scale that measures basic nursing skills, operational skills, service attitude, and nursing safety. Each dimension is scored from 0 to 25, with a total possible score of 100. Higher scores indicate better nursing quality. The scale's reliability was confirmed with a Cronbach's α coefficient of 0.944; and (5) Occurrence of adverse events: This includes conditions such as stress injuries, intraoperative hypothermia, and surgical infections.

Statistical analysis

Data were analyzed using the SPSS version 22.0 software. Categorical data were expressed as percentages and analyzed using the χ^2 test; continuous data, assumed to follow a normal distribution, were analyzed with *t*-tests and *Z*-tests between groups. A P value < 0.05 was considered statistically significant.

RESULTS

General information

From May 2019 to May 2024, a total of 230 patients were selected and divided into two groups of 115 patients each. Inclusion criteria included: (1) Diagnosis of gastric cancer per the Chinese Clinical Oncology Branch Clinical Guidelines; (2) Patients undergoing radical treatment; (3) No surgical history within the past 6 months; (4) An American Association of Anesthesiologists classification of grade I or higher; and (5) Informed consent obtained from patients and their families. Exclusion criteria included: (1) Presence of lung cancer, skin cancer, or other malignant tumors; (2) Prior treatment with chemoradiotherapy; (3) Alcoholism; and (4) Home body temperature < 36 °C or > 37 °C. The clinical data showed no significant differences between the two groups (P > 0.05), as detailed in Table 1.

Clinical indicators for comparison between the two groups

The implantation time and hospital stay durations significantly differed (P < 0.05), whereas intraoperative blood loss and body temperature showed no significant difference (P > 0.05), as indicated in Table 2.

Comparison of the stress response between the two groups

Before nursing, stress scores were similar between the groups (P > 0.05). After nursing, stress scores increased relative to

Table 1 Comparison of the clinical data between the two groups

Index		Conversation (*n* = 115)	Control (*n* = 115)	$\chi^2/t/Z$	*P* value
Gender, *n* (%)	Male	75 (65.22)	76 (66.09)	0.019	0.890
	Female	40 (34.78)	39 (33.91)		
Age (years)		49.69 ± 10.69	49.35 ± 10.22	0.247	0.805
Course of disease (months)		8.41 ± 0.98	8.50 ± 0.91	0.722	0.471
Body quality (kg)		64.21 ± 6.25	64.37 ± 6.11	0.196	0.845
Disease type, *n* (%)	Upper stomach cancer	59 (51.30)	58 (50.43)	0.035	0.972
	Central stomach cancer	32 (27.83)	34 (29.57)		
	Lower stomach cancer	24 (20.87)	23 (20.00)		
Degree of education, *n* (%)	Junior high school and below	26 (22.61)	28 (24.35)	0.396	0.692
	Senior school	40 (34.78)	41 (35.65)		
	Specialist and above	49 (42.61)	46 (40.00)		
Domicile, *n* (%)	Urban	78 (67.83)	75 (65.22)	0.176	0.675
	Countryside	37 (32.17)	40 (34.78)		

Table 2 Comparison of two groups, mean ± SD

Group	Case	Intraoperative bleeding (mL)	After the temperature (°C)	Get out of bed time (day)	Length of stay (day)
Conversation	115	174.21 ± 8.14	36.56 ± 0.44	2.31 ± 0.45	7.14 ± 0.65
Control	115	175.98 ± 8.11	36.49 ± 0.32	3.25 ± 0.63	8.67 ± 0.71
t value		1.652	1.380	13.020	17.045
P value		0.100	0.169	< 0.001	< 0.00

pre-nursing levels ($P < 0.05$) and were lower than those in the control group ($P < 0.05$), as shown in Table 3.

The postoperative gastrointestinal function recovery was compared between the two groups

Differences in postoperative gastrointestinal function recovery between the groups were statistically significant ($P < 0.05$), as shown in Table 4.

Comparison of the quality of care between the two groups

Nursing quality scores were higher in the study group compared to the control ($P < 0.05$), as illustrated in Table 5.

Comparison of adverse events between the two groups

The incidence of adverse events such as stress injuries and surgical infections was lower in the observation group ($P < 0.05$), as presented in Table 6.

DISCUSSION

Gastric cancer, a malignant tumor originating from the gastric mucosal cells, is influenced by a variety of factors including *Helicobacter pylori* infection, precancerous lesions, genetics, environmental factors, and diet[1]. Gastrectomy remains a primary treatment approach for gastric cancer, aiming to completely remove tumor cells to prevent recurrence, thereby enhancing patient survival rates and quality of life[2,3]. Despite its effectiveness, radical gastrectomy can lead to complications such as hypothermia, resulting from factors like anesthetic effects on central regulatory functions, skin disinfection, and liquid infusion, all of which increase the risk of surgical infection and hypothermia during surgery[5,6]. Intraoperative hypothermia may cause low arrhythmia, affect the central nervous system, induce thermoregulatory vasoconstriction, and elevate the risk of surgical infections[7].

Intraoperative constant temperature nursing involves implementing various insulation measures throughout the surgical process to maintain the stability of core body temperature, thereby reducing the risks associated with low intraoperative temperatures and enhancing surgical safety. Initial insulation care includes using warmed solutions such as saline and disinfectants, adjusting the temperature of incubators, minimizing skin disinfection time, and utilizing

Table 3 Comparison of the stress response between the two groups, mean ± SD

Group	Case	Alarm heighten reaction		Avoidance reaction		The traumatic experience repeatedly reproduces the response	
		Before	After	Before	After	Before	After
Conversation	115	6.04 ± 0.78	12.77 ± 1.20[a]	9.14 ± 0.92	15.69 ± 1.78[a]	5.16 ± 0.74	9.49 ± 0.94[a]
Control	115	6.20 ± 0.71	15.87 ± 1.34[a]	9.37 ± 0.88	17.74 ± 1.40[a]	5.20 ± 0.69	11.88 ± 1.45[a]
t value		1.627	18.481	1.937	9.708	0.424	14.832
P value		0.105	< 0.001	0.054	< 0.001	0.672	< 0.001

[a]$P < 0.05$.

Table 4 Comparison of the postoperative recovery of gastrointestinal function between the two groups, mean ± SD

Group	Case	Time of first postoperative defecation (hour)	Time of first feeding (hour)	First exhaust time (hour)	Time of bowel song recovery (hour)
Observation	115	126.04 ± 6.88	84.52 ± 4.05	80.14 ± 5.23	34.69 ± 1.26
Control	115	131.69 ± 6.58	98.41 ± 4.66	86.77 ± 5.41	40.05 ± 1.44
t value		6.364	24.126	9.449	30.040
P value		< 0.001	< 0.001	< 0.001	< 0.001

Table 5 Comparison of the quality of care between the two treatment groups, mean ± SD

Group	Case	Basic nursing	Manipulative skill; operator skill	Attitude towards customers	Nursing safety
Observation	115	19 ± 1.0	20 ± 1.0	21 ± 2.0	20 ± 2.0
Control	115	16 ± 1.0	17 ± 1.0	18 ± 1.0	17 ± 1.0
t value		22.749	22.749	14.387	14.387
P value		< 0.001	< 0.001	< 0.001	< 0.001

Table 6 Comparison of adverse events between the two groups, *n* (%)

Group	Case	Pressure injury	Intraoperative hypothermia	Surgical infection	Total incidence
Observation	115	2 (1.74)	0 (0.00)	1 (0.87)	3 (2.61)
Control	115	6 (5.22)	0 (0.00)	4 (3.48)	10 (8.70)
χ^2					3.995
P value					0.046

inflatable blankets to cover non-surgical areas to minimize heat loss[8]. Subsequent heating care involves placing a resistance heating blanket on the operating table to warm the contact areas between the patient's skin and the hospital bed, and warming infusion liquids to mitigate the effects of heat loss[9]. Continuous monitoring of body temperature allows for immediate adjustment of nursing measures, such as altering the operating room temperature or adjusting the heating blanket, which aids in maintaining the stability of the patient's core body temperature. Although intraoperative constant temperature nursing significantly reduces the risk of hypothermia in patients undergoing radical gastrectomy, its effectiveness in controlling other surgical risks and improving outcomes for stress injuries and other adverse events often requires integration with additional nursing strategies to enhance overall care effectiveness.

In this study, the times of ambulation, hospital stays, and the recovery of postoperative gastrointestinal function among patients varied significantly ($P < 0.05$), indicating that the integration of operating room care in the FMEA model significantly accelerates postoperative recovery. The FMEA model systematically and proactively identifies risks during surgery, thoroughly evaluates patients, identifies known or potential risks, and implements preventative measures to reduce the likelihood of risk events[8]. As a method of analysis and proactive thinking, the FMEA model has been successfully applied in various fields including software development and catering services, and notably in medicine and health. It has shown positive outcomes in drug safety, surgical safety, and infectious disease prevention[10]. Operating

room care under the FMEA model effectively controls risk factors during surgical procedures, meets the personalized needs of patients, and enhances surgical safety. In the FMEA model, before study commencement, the workflow was established in a group meeting; initially, a professional nursing team was formed to ensure high-quality nursing services. This was followed by data collection, process confirmation, and risk assessment to identify potential intraoperative risks in patients undergoing radical gastric cancer surgery. Risk analysis was then performed, including the creation of a surgical flow chart to evaluate and ensure the safety of the surgical procedure. High-risk items were identified based on RPN values; finally, based on these evaluations, risk causes were analyzed, and targeted corrective measures were implemented in conjunction with intraoperative thermostatic nursing care. These measures are designed to reduce the likelihood of risk events and minimize surgical trauma, thereby speeding up the postoperative recovery of patients. Table 6 shows a significant difference in the incidence of adverse events between the two groups ($P < 0.05$), further supporting the efficacy of operating room care in the FMEA model in reducing patient risk events.

Gastrectomy for gastric cancer is an invasive treatment that can cause significant physical stress and induce stress reactions in patients. The data from our study indicated that the stress response scores for both patient groups (temperature-controlled and FMEA observation) were higher post-nursing than pre-nursing ($P < 0.05$), confirming the validity of these observations. However, the control group exhibited a lower stress response ratio ($P < 0.05$), suggesting that combined care effectively reduces stress responses in patients undergoing radical gastric cancer surgery. The FMEA model of operating room nursing involves forming a professional team, conducting risk assessments and analyses to promptly identify potential failure modes, and objectively and prospectively detecting flaws in the gastric cancer surgery process. This approach enables the team to analyze the causes of defects and implement effective corrective actions, thereby enhancing nursing outcomes[11]. Furthermore, intraoperative constant temperature nursing, which includes insulation care, heating, and temperature monitoring, helps maintain a stable core body temperature, reducing the likelihood of intraoperative hypothermia. Combined with the FMEA mode, these measures further decrease the risk of adverse events and lessen surgical trauma, ultimately reducing patient stress responses. The data also show significant differences in nursing quality scores between the two groups ($P < 0.05$), indicating that combined nursing significantly enhances the quality of care for patients with radical gastric cancer surgery. Operating room nursing under the FMEA model is a forward-looking and predictive risk management method that enables timely detection of changes in patient conditions, allowing for the prompt implementation of effective targeted nursing measures. Through a series of structured nursing procedures, this method not only improves patient safety but also enhances overall nursing quality [12]. Moreover, operating room nursing under the FMEA model systematically analyzes safety risks during patient operations, develops targeted nursing measures, and refines the nursing workflow. This approach significantly improves the overall medical safety indices for patients undergoing radical resection of gastric cancer and, when combined with intraoperative constant temperature nursing, further elevates the quality of nursing care[13-15].

Although this study has demonstrated the positive impact of implementing the FMEA model in operating room nursing on the quality of care for patients undergoing radical gastrectomy, it is important to acknowledge certain limitations. First, our sample was restricted to patients from a single medical center, potentially limiting the generalizability of our findings. Future studies should aim to include a more diverse patient population from multiple centers, encompassing various ethnicities and cultural backgrounds to broaden the applicability of the results. Second, despite efforts to ensure uniform application of the FMEA model, variations in nursing practices may have influenced the consistency of our results. Future research should investigate strategies to standardize the implementation of the FMEA model to guarantee consistent quality of care across all patients. Additionally, this study primarily focused on short-term postoperative outcomes. We recommend long-term follow-up in future research to evaluate the enduring effects of the FMEA model on patient prognosis[16-18]. Lastly, this study did not evaluate the cost-effectiveness of the FMEA model. Given the significance of resource allocation, subsequent studies should include a cost-benefit analysis to ascertain the economic viability of implementing the FMEA model in various healthcare settings[19,20]. By recognizing these limitations and addressing them in future research, we can further refine the application of the FMEA model in surgical nursing and enhance the quality of care provided to patients.

CONCLUSION

As demonstrated above, operating room nursing that incorporates the FMEA model, alongside intraoperative constant temperature nursing, effectively reduces the intraoperative stress response in patients undergoing radical gastric cancer surgery. This approach also accelerates postoperative recovery, minimizes the risk of adverse events, and enhances the overall quality of nursing care. Given these benefits, this combined nursing strategy is recommended for wider adoption in clinical practice.

FOOTNOTES

Author contributions: Wang XY designed the study; Wang XY, Zhao YL, Song XY, Mo L and Xiao ZW were involved in acquisition, analysis, and interpretation of data; Wang XY and Zhao YL were involved in data verification and writing of the manuscript; all authors have read, critically reviewed, and approved the final manuscript; all authors were responsible for the decision to submit the manuscript for publication.

Institutional review board statement: This study was reviewed and approved by the Institutional Review Board of the Affiliated Hospital

of Southwest Medical University.

Informed consent statement: All study participants and their legal guardians provided written informed consent prior to study enrolment.

Conflict-of-interest statement: The authors report no relevant conflicts of interest.

Data sharing statement: No additional data are available.

Country of origin: China

ORCID number: Xian-Yong Wang 0009-0009-6286-799X; Yi-Lei Zhao 0009-0009-0286-5589.

S-Editor: Lin C
L-Editor: A
P-Editor: Yuan YY

REFERENCES

1 **Thrift AP**, Wenker TN, El-Serag HB. Global burden of gastric cancer: epidemiological trends, risk factors, screening and prevention. *Nat Rev Clin Oncol* 2023; **20**: 338-349 [PMID: 36959359 DOI: 10.1038/s41571-023-00747-0]
2 **Yamashita Y**, Tatsubayashi T, Okumura K, Sakura Y, Miyamoto T. Robotic radical distal gastrectomy for gastric cancer using the soft coagulation scissors technique. *J Robot Surg* 2023; **17**: 605-611 [PMID: 36169804 DOI: 10.1007/s11701-022-01459-w]
3 **Lou J**, Fan Y, Cui S, Huang N, Jin G, Chen C, Zhang C, Li J. Development and validation of a nomogram to predict hypothermia in adult burn patients during escharectomy under general anesthesia. *Burns* 2024; **50**: 93-105 [PMID: 37821272 DOI: 10.1016/j.burns.2023.06.010]
4 **Wang FH**, Shen L, Li J, Zhou ZW, Liang H, Zhang XT, Tang L, Xin Y, Jin J, Zhang YJ, Yuan XL, Liu TS, Li GX, Wu Q, Xu HM, Ji JF, Li YF, Wang X, Yu S, Liu H, Guan WL, Xu RH. The Chinese Society of Clinical Oncology (CSCO): clinical guidelines for the diagnosis and treatment of gastric cancer. *Cancer Commun (Lond)* 2019; **39**: 10 [PMID: 30885279 DOI: 10.1186/s40880-019-0349-9]
5 **Sabbag IP**, Hohmann FB, Assunção MSC, de Freitas Chaves RC, Corrêa TD, Menezes PFL, Neto AS, Sá Malbouisson LM, Lobo SMA, Amendola CP, de Aguilar-Nascimento JE, Silva JM Jr; BRASIS Study Group. Postoperative hypothermia following non-cardiac high-risk surgery: A prospective study of temporal patterns and risk factors. *PLoS One* 2021; **16**: e0259789 [PMID: 34780517 DOI: 10.1371/journal.pone.0259789]
6 **Berkmen YM**, Lande A. Chest roentgenography as a window to the diagnosis of Takayasu's arteritis. *Am J Roentgenol Radium Ther Nucl Med* 1975; **125**: 842-846 [PMID: 2023 DOI: 10.2214/ajr.125.4.842]
7 **Kameda N**, Okada S. Evaluation of Postoperative Warming Care Protocol for Thermal Comfort and Temperature Management Immediately After Surgery: Nonrandomized Controlled Trial. *J Perianesth Nurs* 2023; **38**: 427-433 [PMID: 36609134 DOI: 10.1016/j.jopan.2022.07.001]
8 **Yang H**, Luo W, Guo L, Zhu H, Peng W. Fall risk management in interventional prenatal diagnosis perioperative pregnant women based on tracking methodology and failure mode and effect analysis application. *Medicine (Baltimore)* 2023; **102**: e35477 [PMID: 37933047 DOI: 10.1097/MD.0000000000035477]
9 **Lu Y**, Zhou Q, Wang LN, He T, Zhao HY, Cao XQ. [Application effects of failure mode and effect analysis on the limb posture positioning nursing of extremely severe burn patients]. *Zhonghua Shao Shang Za Zhi* 2021; **37**: 1078-1084 [PMID: 34794260 DOI: 10.3760/cma.j.cn501120-20210412-00126]
10 **Zhang QP**, Wang XT, Lu JQ, Shi FJ, Jia L, Jin JW, Feng QL, Cai Y. [Application of failure mode and effect analysis in reducing the risk of nosocomial infection]. *Zhonghua Lao Dong Wei Sheng Zhi Ye Bing Za Zhi* 2021; **39**: 189-192 [PMID: 33781034 DOI: 10.3760/cma.j.cn121094-20200224-00082]
11 **Sadler ED**, Avdic E, Cosgrove SE, Hohl D, Grimes M, Swarthout M, Dzintars K, Lippincott CK, Keller SC. Failure modes and effects analysis to improve transitions of care in patients discharged on outpatient parenteral antimicrobial therapy. *Am J Health Syst Pharm* 2021; **78**: 1223-1232 [PMID: 33944904 DOI: 10.1093/ajhp/zxab165]
12 **Sandelin A**, Kalman S, Gustafsson BÅ. Prerequisites for safe intraoperative nursing care and teamwork-Operating theatre nurses' perspectives: A qualitative interview study. *J Clin Nurs* 2019; **28**: 2635-2643 [PMID: 30865340 DOI: 10.1111/jocn.14850]
13 **Liu HC**, Zhang LJ, Ping YJ, Wang L. Failure mode and effects analysis for proactive healthcare risk evaluation: A systematic literature review. *J Eval Clin Pract* 2020; **26**: 1320-1337 [PMID: 31849153 DOI: 10.1111/jep.13317]
14 **Askari R**, Shafii M, Rafiei S, Abolhassani MS, Salarikhah E. Failure mode and effect analysis: improving intensive care unit risk management processes. *Int J Health Care Qual Assur* 2017; **30**: 208-215 [PMID: 28350224 DOI: 10.1108/IJHCQA-04-2016-0053]
15 **Anjalee JAL**, Rutter V, Samaranayake NR. Application of Failure Mode and Effect Analysis (FMEA) to improve medication safety: a systematic review. *Postgrad Med J* 2021; **97**: 168-174 [PMID: 32843483 DOI: 10.1136/postgradmedj-2019-137484]
16 **Abbassi A**, Ben Cheikh Brahim A, Ouahchi Z. Failure mode and effect analysis applied to improve the medication management process in a pharmacy of a teaching hospital and a proposal for a simplified rating system. *Eur J Hosp Pharm* 2023; **30**: e55-e60 [PMID: 35064019 DOI: 10.1136/ejhpharm-2021-003013]
17 **Thornton E**, Brook OR, Mendiratta-Lala M, Hallett DT, Kruskal JB. Application of failure mode and effect analysis in a radiology department. *Radiographics* 2011; **31**: 281-293 [PMID: 20980666 DOI: 10.1148/rg.311105018]

18 **Darcissac C**, Duvert L, Hoegy D, Chappuy M, Pivot C, Janoly-Dumenil A. [Prospective risk analysis in a retrocession unit: Focus on drug dispensation process]. *Ann Pharm Fr* 2020; **78**: 12-20 [PMID: 31564422 DOI: 10.1016/j.pharma.2019.06.006]

19 **Cavus H**, Bulens P, Tournel K, Orlandini M, Jankelevitch A, Crijns W, Reniers B. Safety and efficiency of a fully automatic workflow for auto-segmentation in radiotherapy using three commercially available deep learning-based applications. *Phys Imaging Radiat Oncol* 2024; **31**: 100627 [PMID: 39253729 DOI: 10.1016/j.phro.2024.100627]

20 **Qiu Q**, Zhu G, Peng G, Chen Z, Zhu Z, Zhou Y, Ye Y, Shen Y, Wang L. Research on PIVAS risk assessment and control strategy based on quality risk management (QRM). *Explor Res Clin Soc Pharm* 2024; **15**: 100487 [PMID: 39224692 DOI: 10.1016/j.rcsop.2024.100487]

Published by **Baishideng Publishing Group Inc**
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA
Telephone: +1-925-3991568
E-mail: office@baishideng.com
Help Desk: https://www.f6publishing.com/helpdesk
https://www.wjgnet.com