Scientific Research Publishing

Yangtze Medicine, 2023, 7, 27-42
https://www.scirp.org/journal/ym
ISSN Online: 2475-7349
ISSN Print: 2475-7330

Summary of the Best Evidence for the Evaluation and Management of Chemotherapy-Related Nausea and Vomiting in Cancer Patients

Panpan Zheng[1*], Yongsheng Ou[2*], Jinyan Jiang[1], Hongting Liu[1], Xinxia Mo[1], Jinling Li[1#]

[1]Shanghai Pulmonary Hospital Affiliated to Tongji University, Shanghai, China
[2]Shanghai Baoshan District Hospital of Integrated Traditional Chinese and Western Medicine, Shanghai, China
Email: #fanglishanghai@163.com

How to cite this paper: Zheng, P.P., Ou, Y.S., Jiang, J.Y., Liu, H.T., Mo, X.X. and Li, J.L. (2023) Summary of the Best Evidence for the Evaluation and Management of Chemotherapy-Related Nausea and Vomiting in Cancer Patients. *Yangtze Medicine*, **7**, 27-42.
https://doi.org/10.4236/ym.2023.71004

Received: February 9, 2023
Accepted: March 14, 2023
Published: March 17, 2023

Abstract

Objective: To summarize the best evidence for the evaluation and management of chemotherapy-related nausea and vomiting in cancer patients, so as to promote the standardized management of chemotherapy-related nausea and vomiting in cancer patients. **Methods:** A computer search was conducted for all evidence on chemotherapy-associated nausea and vomiting interventions, including guidelines, expert consensus, best clinical practice information booklet, recommended practice, evidence summary, and systematic review. The search period is from April 30, 2022. After the literature quality evaluation, the evidence extraction and summary of the literature meeting the quality standards. **Results:** A total of 16 literatures were included, including 9 guidelines, 5 systematic reviews and 2 expert consensus papers. 46 pieces of best evidence on the assessment and management of chemotherapy related nausea and vomiting in cancer patients were summarized, including 6 aspects including risk assessment and management, non-drug management, drug management, multidisciplinary cooperation, education and training, and health education. **Conclusion:** This study summarized the current best evidence on the assessment and management of chemotherapy-related nausea and vomiting in cancer patients. Clinical staff should apply evidence according to specific clinical scenarios, professional skills and patients' wishes in order to reduce the degree and incidence of chemotherapy-related nausea and vomiting in cancer patients and improve the quality of care.

*Co-first authors.
#Corresponding author.

Keywords

Cancer Patients, Chemotherapy, Nausea, Vomit, Evidence-Based Nursing, Summary of Evidence

1. Introduction

Cancer is one of the most important health problems facing mankind. Treatment methods mainly include surgical resection, chemotherapy and radiotherapy. At present, chemotherapy is one of the important means of tumor treatment, 70% - 80% of tumor patients need to receive chemotherapy. However, over 90% of chemotherapy drugs will destroy other normal tissue cells while killing tumor cells, resulting in a series of adverse reactions [1]. Among them, nausea and vomiting are the most common adverse reactions of digestive tract. According to statistics, about 70% - 80% of patients receiving chemotherapy are at risk of chemotherapy-related nausea and vomiting [2]. Chemotherapy-induced nausea and vomiting (CINV) refers to nausea (a state characterized by nausea and/or imminent vomiting) and vomiting (a reflex action of vomiting of stomach contents through the mouth) caused by or associated with chemotherapy drugs. CINV can lead to dehydration, metabolic disorders, self-care ability decline, malnutrition, anorexia, physical decline, wound dehysis and esophageal mucosa tear and other adverse consequences, on the emotional, social and physical functions of patients will have significant negative effects, reduce the quality of life and treatment compliance of patients, and may cause metabolic disorders, nutritional disorders, weight loss. All of these situations can increase patients' fear of treatment. According to statistics, CINV can cause about 20% of patients to delay chemotherapy, 30% of patients refuse further chemotherapy, and have to terminate anti-tumor therapy in severe cases, which affects the effect of chemotherapy [3] [4]. Therefore, a positive, reasonable and standardized assessment of chemotherapy related nausea and vomiting in cancer patients is very important to ensure the successful treatment of cancer patients. However, there is still a lack of systematic and standardized nursing guidelines for the evaluation and management of CINV. In view of this, this study conducted systematic retrieval, quality evaluation, evidence extraction and synthesis of domestic and foreign studies on CINV evaluation and management, in order to provide references for clinical medical personnel to implement CINV evaluation and management.

2. Methods

2.1. Deterministic Problem

PIPOST problem development tool of JBI Evidence-Based Center was adopted to determine evidence-based problems in this study [5]. P (Population) Adult cancer patients receiving chemotherapy; I (Intervention) Targeted patient interventions: a series of interventions for the prevention and treatment of chemotherapy-related nausea and vomiting; P (Professional) Practitioners or executors

of evidence application: medical staff, patients and their caregivers; O (Outcome) Outcome measures: incidence and degree of nausea and vomiting in chemotherapy patients; S (Setting) Place for evidence application: oncology ward; T(Type of evidence) Types of evidence resources: clinical decision, best practice, clinical guidelines, evidence summary, systematic review.

2.2. Retrieval Strategy

"Drugtherapy" OR "Chemotherapy" OR "Chemical therapy" OR "Chemical-drug") AND ("Nausea" OR "Naupathia" OR "Emesis" OR "Vomiting" OR "Chemotherapy induced nausea and vomiting "OR" CINV") AND ("Neoplasms" OR "Cancer" OR "Tumor") AND ("Nursing" OR "Assessment" OR "Management" OR "Prevention" OR "Intervention") are English keywords; According to the 6S pyramid basis [6], evidence retrieval starts from the top down. Search Cochrane Library, BMJ Best Practice, JBI Center for International Collaboration in Evidence-Based Health Care Library, Up to Date, Embase, CINAHL, PubMed, Database of Evidence-Based Health Care Centers (JBI), US Guidelines Network, US National Guidelines Database, US National Comprehensive Cancer Network, UK National Institute of Clinical Medicine Guidelines Library, International Guidelines Collaborative Group, Scottish College Guidelines Network, Registered Nurses Association of Ontario, CNKI, Wanfang Database, China Biomedical Literature Database. The search period was from December 31, 2022. Literature inclusion criteria: Study subjects were cancer chemotherapy patients; Studies involving chemotherapy-related nausea and vomiting; The outcome included nausea and vomiting and nausea and vomiting related indicators; Literature types: guidelines, expert consensus, best clinical practice information booklet, recommended practice, evidence summary, systematic review, study inclusion guidelines, expert consensus using the latest version; Language: Chinese and English literature. Exclusion criteria: the document type was only abstract or research proposal; Repeated publication, incomplete literature content, unable to obtain the full text or literature quality evaluation results are low.

2.3. Criteria for Evaluation of Literature Quality

According to the type of the included literature, the corresponding evaluation tools were selected for quality evaluation. 1) Guidelines: Evaluation was carried out using Appraisal of Guidelines for Research and Evaluation Ⅱ (AGREE Ⅱ) (2010 edition), which includes 6 areas [7]. There are 23 entries and 2 overall evaluation entries for the guidelines. Each item will be evaluated according to Likert 7-level scoring method (1 is strongly disagree, 7 is strongly agree), the minimum possible score of a single field = 1 point × number of items × number of evaluators, the maximum possible score of a single field = 7 points × number of items × number of evaluators, each field score is the normalized percentage of the sum of the entries' scores in that field = (actual score-lowest possible score)/(highest possible score-lowest possible score) × 100%. According to the guidelines for standardized percentage evaluation in

6 fields recommended levels: Level A: Standardized percentage of most dimensions > 60%; Level B: The standardized percentage of most dimensions is 30% - 60%; Level C: Standardized percentage of most dimensions < 30%. 2) System evaluation: Quality evaluation was conducted according to JBI evidence-based health care center system evaluation tool [8]. The tool consists of 11 evaluation items, and the evaluator was asked to make a "yes", "no", "unclear" or "not applicable" judgment on each evaluation item. 3) Clinical decision: Trace the original literature based on each piece of evidence in the literature, and use corresponding evaluation tools for evaluation [9]. 4) Consensus evidence: The expert consensus evaluation standard (2016 edition) of JBI evidence-based Health Care Center in Australia was used for evaluation [10].

2.4. Document Quality Evaluation Process

Three nursing graduate students who had undergone systematic evidence-based training and study participated in the literature quality evaluation, and two of them conducted the literature quality evaluation independently. In case of disagreement, the third researcher was invited to conduct the evaluation. When evidence from different sources contradicts each other, this study follows the principle of high-quality evidence, high-level evidence and newly published authoritative literature.

2.5. Classification of Evidence and Recommendation Level

The included evidence adopts the JBI evidence pre-grading and evidence recommendation level system (2014 edition) [11]. According to the type of research design, the evidence level is divided into level 1 - 5. According to the four attributes of evidence: clinical significance, suitability, effectiveness and feasibility, the JBI recommendation strength grading principle was applied to divide the evidence recommendation level into A recommendation and B recommendation. The original literature of evidence summary, clinical decision and guidelines tracing evidence was graded according to this system [12].

2.6. Extraction of Data

Two researchers extracted and cross-checked the relevant contents of the included literature, including author, source, nature of the literature, title, publication period, relevant recommendations, conclusions.

3. Description of Evidence

3.1. General Information about the Included Literature

16 literatures were finally included in this study, including 9 guidelines, 2 expert consensus papers, and 5 systematic reviews, as shown in **Table 1**.

3.2. Quality Evaluation Results of the Included Literature

3.2.1. Quality Evaluation Results of the Guidelines

A total of 9 guidelines were included in this study. The results of standardization

Table 1. General information of the included literature.

Included Literature	Document Source	Document Property	Document Theme	Date of Publication (year)
Shanghai Anti-Cancer Association Cancer Rehabilitation and Palliative Professional Committee [13]	CNKI	Expert Consensus	Shanghai Expert Consensus on the whole course Management of chemotherapy induced nausea and vomiting	2018
Expert Committee on Rational Drug Use, National Health and Family Planning Commission [14]	Yimai Tong	Guidelines	Guidelines for Rational drug use in gastrointestinal malignancies	2017
Jiang WQ *et al.* [15]	CNKI	Expert Consensus	Chinese expert Consensus on prevention and treatment of nausea and vomiting associated with tumor drug therapy	2019
Zhang Y [16]	CNKI	Guidelines	Guidelines for drug prevention and treatment of chemotherapy-induced nausea and vomiting	2022
NCCN [17]	PubMed	Guidelines	Clinical Practice guidelines for Tumor antiemetic NCCN	2011
Aogi K *et al.* [18]	BMJ Best Practice	Guidelines	Japanese Society of Clinical Oncology Clinical Practice guidelines for antiemesis	2021
Tan JY *et al.* [19]	Cochrane Library	Systematic Review	Evidence for auricular acupoints for chemotherapy-induced nausea and vomiting in cancer patients: a systematic review of a randomized controlled trial	2014
Roila F *et al.* [20]	PubMed	Guidelines	MASCC and ESMO Guidelines Update on the prevention of nausea and vomiting from chemotherapy and radiotherapy and in patients with advanced cancer	2016
Hesketh PJ *et al.* [21]	BMJ Best Practice	Guidelines	Antiemetic agents: American Society of Clinical Oncology Clinical Practice Guideline Update	2017
Chen F *et al.* [22]	CNKI	Systematic Review	Meta-analysis of Neiguan acupoint compression in improving chemotherapy related nausea and vomiting in cancer patients	2020
Toniolo J *et al.* [23]	Web of Science	Systematic Review	Effects of inhalation aromatherapy for chemotherapy-induced nausea and vomiting: a systematic review	2021
Wei T T *et al.* [24]	Web of Science	Systematic Review	Music intervention in chemotherapy-induced nausea and vomiting: a systematic review and meta-analysis	2020
Yu SY *et al.* [25]	Yimai Tong	Guidelines	Guidelines for the prevention and treatment of vomiting associated with tumor therapy	2014
Ezzo J *et al.* [26]	Cochrane Library	Systematic Review	A Cochrane systematic review examines acupoint stimulation for nausea and vomiting	2006
Takeuchi *et al.* [27]	BMJ Best Practice	Guidelines	Japan Society of Clinical Oncology 2010 Clinical Practice Guidelines for anti-emetic Cancer	2016
Majem M *et al.* [28]	PubMed	Guidelines	SEOM Clinical Guidelines for Vomiting	2022

and quality evaluation in various fields of the guidelines are shown in Table 2.

3.2.2. Quality Evaluation Results of Systematic Evaluation

A total of five systematic reviews were included in this study from the Cochrane Library, CNKI and Web of Science. Among them, the evaluation results of 11 items in Tan JY *et al.* [19], Toniolo J *et al.* [23] and Ezzo J *et al.* [26] were all "Yes", and the overall quality was high, so they were allowed to be included. Chen F *et al.* [22] and Wei T T [24] *et al.* studied 11 items except item 10, "Is the possibility of publication bias assessed? Except for item 11, "Whether it indicates the relevant conflict of interest", which is evaluated as "unclear", the evaluation results of other items are all "Yes". The overall quality of the study is high, so it is allowed to be included.

3.3. Evidence Description and Summary

The best evidence eventually included in this study came from 9 guidelines, 5 systematic reviews, and 2 expert consensus papers. Through evidence extraction and summary, based on FAME evaluation, 46 best evidence summaries on assessment and management of chemotherapy-related nausea and vomiting from six aspects, including risk assessment and management, non-drug management, drug management, multidisciplinary cooperation, education and training, and health education, were finally formed from the feasibility, suitability, clinical significance and effectiveness of evidence. The specific results are shown in Table 3.

Table 2. Methodological quality evaluation of the guidelines included in this study.

Included literature	Standardized percentage of each field(%)						Number of fields (PCS) ≥ 60%	Number of fields (PCS) ≥ 30%	Recommendation level
	Scope and purpose	participant	Guideline rigor	Guidance clarity	Applicability of guidelines	Guide editorial independence			
Expert Committee on Rational Drug Use, National Health and Family Planning Commission [14]	88.89	77.78	60.42	50.00	41.67	83.33	5	6	B
Zhang Y [16]	88.89	77.78	60.42	50.00	41.67	83.33	4	6	B
NCCN [17]	83.33	80.56	75.00	77.78	75.00	79.17	6	6	A
Aogi K *et al.* [18]	83.33	61.11	72.92	83.33	62.50	66.67	6	6	A
Roila F *et al.* [20]	86.11	88.33	73.15	64.58	66.67	62.50	6	6	A
Hesketh PJ *et al.* [21]	89.89	77.78	79.63	79.17	62.50	33.33	5	6	B
Yu SY *et al.* [25]	83.33	88.89	56.25	72.22	62.50	83.33	5	6	B
Takeuchi *et al.* [27]	72.22	38.89	16.67	83.33	37.50	58.33	2	5	B
Majem M *et al.* [28]	83.33	80.56	75.00	77.78	75.00	79.17	6	6	A

Table 3. Summary of the best evidence for the assessment and management of chemotherapy-associated nausea and vomiting.

Evidential dimension	Content of evidence	Level of evidence	Recommended strength
Risk assessment and management	1. Prior to chemotherapy, it is recommended to collect and assess the risk factors for nausea and vomiting, the risk of vomiting caused by the proposed chemotherapy regimen, and the history and existing diseases of patients. At present, there is no unified standard for the formulation of antiemetic programs based on the above collected information, but it is suggested that patients with high risk factors and accompanying diseases should be appropriately strengthened than patients without antiemetic programs [13].	Level 3	B
	2. Before the start of tumor-related therapy, the risk of vomiting should be fully evaluated according to the emetic risk of the proposed antitumor therapy, the patient's own high risk factors, and the severity of nausea and vomiting in the past, and an individualized vomiting prevention and treatment program should be formulated [14] [15].	Level 2	A
	3. History assessment included opioid use, incomplete or complete intestinal obstruction, vestibular dysfunction, tumor brain metastases, electrolyte disturbances, uremia, and liver dysfunction. Be aware of other factors that may contribute to or aggravate nausea and vomiting in cancer patients, such as age (less than 50 years), female gender, prior history of nausea and vomiting, anxiety, fatigue, motion sickness, poor quality of life, and low alcohol intake [13] [15] [16].	Level 5	A
	4. All patients receiving hyperemetic or moderate emetic chemotherapy should be fully assessed for their risk of CINV, taking into account emetogenic and patient factors such as gender, age, and history of nausea and vomiting in the planned chemotherapy regimen, and effective preventive measures based on evidence-based guidelines [17].	Level 3	A
	5. It is recommended that the Dranitsaris score system can be used to predict the risk of CINV in patients individually [16].	Level 4	B
	6. The MASCC antiemetic Evaluation tool (MAT) is recommended as a self-measuring tool for patients to measure nausea and vomiting [16].	Level 4	B
	7. Focus on the reassessment of CINV risk: the treatment plan should be reassessed and adjusted before the next cycle of treatment; If the objective of chemotherapy is non-curative, the treatment of refractory vomiting may be adjusted [16].	Level 5	A
	8.The efficacy of antiemetic therapy should be evaluated for outpatients at each visit and for inpatients within 24 hours after chemotherapy [18].	Level 5	A
	9. The antiemetic effect should be evaluated within 24 hours after application of antiemetic [19].	Level 2	A
	10. Strict evaluation of the effect of antiemesis should be reported by the patient to the medical staff [19].	Level 3	B
	11. It is recommended that patients' needs and preferences be centered and that patients' home medication be supervised with the help of mobile technology [16].	Level 5	A
	12. It is recommended to follow up CINV from the beginning of chemotherapy to the 5th day after chemotherapy, including the frequency and degree of nausea and vomiting, physical condition and medication [13].	Level 3	B

Continued

Non-drug management	13. The treatment of CINV should focus on prevention [16].	Level 4	B
	14. The whole course management before, during and after chemotherapy can effectively reduce and control the occurrence of CINV [13].	Level 3	B
	15. Acupressure can be used as an effective auxiliary treatment measure to improve CINV, which can reduce acute and delayed nausea. Neiguan acupressure can improve the severity of nausea and vomiting symptoms caused by chemotherapy in cancer patients, and reduce the frequency of nausea, vomiting and retching, but the effect is not obvious in improving the severity of retching and vomiting experience time [20] [21] [22].	Level 2	B
	16. Chinese acupuncture has been shown to be effective in controlling anticipatory nausea and vomiting [26].	Level 2	B
	17. Aromatherapy can significantly relieve acute nausea, acute retching and delayed retching after chemotherapy [23].	Level 2	B
	18. Ginger and other Chinese herbs are not recommended for CINV prevention [16].	Level 2	B
	19. On the basis of routine nursing during chemotherapy, individualized music intervention can significantly reduce the occurrence of severe nausea and vomiting in patients, and can significantly improve patients' tolerance to nausea and vomiting [24].	Level 2	B
	20. It is recommended to create a pleasant and comfortable environment, and encourage patients to listen to music, read, watch TV, draw and other activities to divert patients' attention and stabilize their emotions, so as to relieve nausea and vomiting. Behavioral therapies such as yoga, progressive muscle relaxation, hypnotherapy, biofeedback and systematic desensitization can also be used [15] [25].	Level 5	A
	21. Behavioral therapy, especially progressive muscle relaxation training, systematic desensitization/behavioral therapy, relaxation therapy and hypnotherapy, is effective in improving anticipatory nausea and vomiting [18].	Level 2	A
	22. Ensure adequate liquid supply, maintain water and electrolyte balance, and correct acid-base imbalance [25].	Level 5	A
	23. It is recommended to replace plain water with sour fruit juice, broth and vegetable soup during chemotherapy to supplement water and nutrition, so as to relieve nausea and vomiting [25].	Level 5	A
	24. It is recommended to eat a reasonable diet, choose easy to digest, fit the appetite of the food, control the amount of food, do not eat cold or overheated food, eat a small number of meals, eat 5 to 6 meals a day, and eat more in the morning, less water before and after eating [14] [25].	Level 3	A
	25. Patients are advised to avoid eating for 1 to 2 hours before and after chemotherapy, and to lie down half an hour after eating [25].	Level 5	A
	26. Avoiding exposure to irritating, odorous, or smelly gases can help in the treatment of anticipatory nausea and vomiting [15].	Level 3	A
	27. According to the emetic risk of chemotherapeutic drugs and regiments, hierarchical management was carried out [25].	Level 5	A
	28. It is recommended to establish a follow-up file for patients, complete record and dynamic assessment of patients' nausea and vomiting, and periodic summary for dynamic adjustment of management strategies [25].	Level 4	A

Continued

Drug management	29. The choice of antiemetic drugs should be based on the emetic risk of chemotherapy regimen and previous experience with antiemetic drugs, with full consideration of the patient's relevant risk factors (female, history of motion sickness or morning sickness, under 50 years of age, history of alcohol consumption, anxiety, and history of chemotherapy induced nausea and vomiting) [16].	Level 5	A
	30. Determine the best treatment for patients at risk of emesis. If oral administration is difficult for vomiting patients, rectum or intravenous administration may be possible; Multiple drug combinations can be used when necessary, and different regimens or pathways can be selected [25].	Level 5	A
	31. For patients without a history of nausea and vomiting, antiemetic drugs do not need to be routinely administered before chemotherapy [25].	Level 2	A
	32. Intensive antiemesis is recommended for patients with a history of vomiting, motion sickness, anxiety and other high risk factors for nausea and vomiting [13].	Level 3	B
	33. Antiemetic drugs for CINV may be administered orally, percutaneous, intravenously, and non-oral routes are recommended for patients at risk of CINV or who are unable to swallow and digest tablets due to vomiting [16].	Level 5	A
	34. Long-acting or combination antiemetics are recommended for patients with day chemotherapy prior to chemotherapy to reduce the need for home administration [16].	Level 1	A
	35. Oral or topical dosage forms are recommended for patients at home to increase convenience of administration and patient comfort [16].	Level 5	A
	36. Intravenous injection 30 minutes before the first dose of chemotherapy; Oral preparations should be used 30 to 60 minutes before the first dose of chemotherapy drugs. The transdermal patch should be applied to the flat skin of the upper arm/forechest 24 to 48 hours before the first dose of chemotherapy. For the prevention of delayed nausea and vomiting, oral antiemetic medication should be taken in the morning when getting up [16].	Level 5	A
	37. While preventing and treating vomiting, care should be taken to avoid adverse reactions to antiemetic drugs [14].	Level 3	A
	38. Patients should self-manage the use of oral medications. However, optional intravenous administration should be considered in cases where nausea and vomiting prevent patients from receiving oral therapy [27].	Level 4	B
	39. In the presence of CINV, single antiemetic oral medication or prophylaxis is recommended for patients receiving low or minimal emetic oral medication. If multiple oral medications are used in combination, the risk of vomiting may increase and adequate prevention is needed [28].	Level 2	B
	40. For breakthrough nausea and vomiting, 24 hours of fixed administration should be considered, depending on the patient's symptoms [18].	Level 3	B
Multidisciplinary cooperation	41. The establishment of MDT teams including oncologists, gastroenterologists, nurses, clinical pharmacists and dietitians is conducive to standardizing CINV management, reducing the incidence of CINV, improving patients' compliance, improving patients' quality of life, and improving patients' treatment satisfaction [16].	Level 3	A
Education and training	42. Strengthen training of CINV nurses, including awareness of highly emetic chemotherapy (HEC) and moderate emetic chemotherapy (MEC) regiments, the role of patient-related factors, and the importance of optimal preventive care [17].	Level 4	B

Continued

Health education	43. For patients with anticipatory nausea and vomiting, more knowledge about CINV can be provided so that they can fully understand what may happen in the course of treatment and corresponding measures can be given. For patients with excessive anxiety, antianxiety medication may be administered the night before [13].	Level 3	B
	44. Life and psychological education for patients and their caregivers is helpful to reduce the occurrence of CINV [16].	Level 2	A
	45. The doctor, nurse, or clinical pharmacist should describe the various types of CINV, such as acute, delayed, and anticipatory nausea and vomiting, to the patient in detail. Key talking points include describing how CINV treatment is preventative in nature, and that they should continue to use anti-emetic medication on time even if they do not experience nausea or vomiting. Education on delayed nausea and vomiting should be paid particular attention to patients discharged from hospital and at home with oral chemotherapy [16].	Level 3	A
	46. Common adverse reactions to antiemetic drugs include constipation, headache, extrapyramidal reactions, arrhythmia, excessive sedation, and metabolic syndrome. We should strengthen the education of patients, treat the symptoms when the symptoms are serious, and adjust the next cycle of chemotherapy to prevent and stop emesis program accordingly [16].	Level 3	A

4. Results

4.1. Risk Assessment and Management

The occurrence and severity of CINV are affected by a variety of factors, the mechanism of which is complex and there are large individual differences. In recent years, it has been clear that, in addition to the type of chemotherapy drugs or administration plan, individual risk factors such as patient's gender, age and history of morning sickness also affect the occurrence of CINV in high-risk patients. The likelihood of CINV in high-risk patients is 3 - 4 times that of low-risk patients. Therefore, early prediction, rapid identification of CINV risk, and effective control of CINV is extremely critical. Comprehensive collection of individual CINV influencing factors and accurate symptom assessment are the basis of treatment decision-making and adjustment. History assessment included patient age, psychological expectations, sleep status, morning sickness history, whether patients had received chemotherapy with platinum-based or anthracyclines, whether they had taken over-the-counter antiemetic drugs at home, and whether CINV had occurred during previous chemotherapy. The Dranitsaris scoring system and online tool (http://www.riskcinv.org/) can be used to individually predict the risk of CINV in patients, which can easily identify high-risk patients before each chemotherapy cycle, so as to optimize patients' CINV management and adjust medication in subsequent courses [29]. A comprehensive assessment of symptoms can lead to more interventionable information and individualized interventions to reduce the patient's experience of discomfort. Due to the subjectivity of CINV, patients can get the best symptom management only after they accurately self-report their symptoms [30]. It is recommended that clinicians provide patient-appropriate tools for measuring nausea and vomiting

to help patients accurately self-report CINV, inform patients how to monitor CINV and note the severity of symptoms, and encourage patients to freely discuss their thoughts, fears, and experiences with CINV. At present, visual simulation scale MASCC antiemesis Evaluation tool (MAT) is clinically recommended as a self-measuring tool for patients to measure nausea and vomiting. It is a self-reporting CINV evaluation tool, which can be used by printing forms or smart phone applications [31]. At the same time, attention should be paid to the reassessment of CINV risk, and the treatment plan should be reassessed and adjusted before the next cycle of treatment. Antiemetic efficacy should be evaluated at every visit for outpatients and within 24 hours after chemotherapy for inpatients. The antiemetic effect and adverse drug reactions should be timely evaluated after each application of antiemetic drugs, and generally reported by the patient to the medical staff within 24 hours after medication. For discharged patients should pay attention to the continuity of care outside the hospital, do a good job of follow-up work, follow-up time recommended from the beginning of chemotherapy to the 5th day after chemotherapy, can use mobile technology to monitor patients at home medication, the recommended follow-up content includes nausea and vomiting frequency and degree, physical condition, medication, etc.

4.2. Non-Drug Management

Non-drug intervention plays an important role in alleviating CINV in patients. Non-drug intervention has low risk and low cost, so it has been widely concerned at present. At present, CINV treatment is mainly prevention, the whole risk period should be protected against CINV, and the program recommended by the guidelines should be used to standardize treatment. In the whole CINV management, it is very important to establish the system of multiple follow-up visits, complete records and dynamic evaluation. The whole-course management of CINV before, during and after treatment can effectively reduce and control the occurrence of CINV in patients. At present, the nursing technique of traditional Chinese medicine has been widely concerned because of its less trauma and better curative effect. Acupressure and acupuncture of traditional Chinese medicine can be used as effective auxiliary treatment measures to improve CINV, and aromatherapy also has a certain effect on CINV. There is insufficient evidence for the use of ginger and other complementary or alternative therapies to prevent nausea and vomiting in cancer patients, and ginger and other Chinese herbs are not recommended for the prevention of CINV. Pleasant and comfortable environment is particularly important for patients. Studies have pointed out that creating a good environment can alleviate the discomfort brought by CINV to patients. Therefore, medical staff should do a good job of ward environment sorting and maintenance work. In addition, for patients with CINV, dietary care is indispensable, should be a reasonable collocation of diet, light diet, eat less and more meals, eat 5 - 6 meals a day, and eat more properly in the morning, before and after eating less water. During chemotherapy, juice with sour flavor, broth,

vegetable soup instead of plain water to replenish moisture and nutrition, to relieve nausea and vomiting. Ensure adequate liquid supply, maintain water and electrolyte balance, and correct acid-base imbalance. Avoid eating within 1 to 2 hours before and after chemotherapy, and lie down half an hour after eating to avoid gastroesophageal reflux and vomiting symptoms. Avoid exposure to irritating, odorous or smelly gases during chemotherapy to avoid exacerbating nausea and vomiting. Therefore, medical staff should strengthen the health education of patients and their families, in order to alleviate the discomfort caused by CINV through education and guidance. According to the emetic risk of chemotherapy drugs and programs, the patients were managed by grades, and follow-up files were established to record and dynamically evaluate the nausea and vomiting of patients, conduct whole-process management, and summarize regularly, so as to dynamically adjust the management strategy, so as to conduct early intervention, reduce the nausea and vomiting symptoms of patients, and improve the quality of life of patients.

4.3. Drug Management

Nausea and vomiting caused by chemotherapy can be divided into three categories: acute, delayed and antiemetic. It is suggested that the selection of antiemetic drugs should be based on the emetic risk of chemotherapy regimen and previous experience in using antiemetic drugs, and the relevant risk factors of patients should be fully considered. Risk factors include being female, having a history of motion sickness or morning sickness, being younger than 50, drinking alcohol, anxiety, and a history of chemotherapy-related nausea and vomiting. These risk factors can increase the probability of its occurrence. CINV antiemetic drugs can be administered orally, percutaneous, intravenously, or rectum or intravenously if the vomiting patient is unable to swallow and digest the tablets due to vomiting; When necessary, multiple drug combination therapy can be selected, and different schemes or different routes can be selected. The usage, dosage and time of different routes of administration should be mastered, and the adverse reactions of drugs should be observed. Oral or topical dosage forms can be used for patients at home to increase convenience of administration and patient comfort. Long-acting or combination antiemetics may be used before chemotherapy to reduce the need for home administration. Prevention of CINV should be initiated before chemotherapy and should last long enough to cover the duration of the risk of vomiting. For patients without a history of nausea and vomiting, it is not necessary to routinely administer antiemetic drugs before chemotherapy. For patients with a history of vomiting, motion sickness, anxiety and other high-risk factors for nausea and vomiting, strengthen antiemesis. For breakthrough nausea and vomiting, 24 hours of fixed administration should be considered, depending on the patient's symptoms.

4.4. Multidisciplinary Cooperation

The implementation of multidisciplinary management, medical work process

has both division of labor and cooperation, mutual assistance and different focus. The establishment of MDT teams including oncologists, gastroenterologists, nurses, clinical pharmacists and dietitians is conducive to standardizing CINV management, reducing the incidence of CINV, improving patients' compliance, improving patients' quality of life, and improving patients' treatment satisfaction.

4.5. Education and Training

Although the use of antiemetic drugs can reduce the incidence of CINV, the improvement effect of CINV is not good due to the underestimation of CINV problems by patients or medical staff and the non-standard use of clinical practice guidelines in the control and management of CINV. Oncology nurses play an important role in nursing patients with chemotherapy, and their influence and status become more and more prominent. The core position of nurses in CINV management can effectively control the occurrence of CINV and play a positive role in improving patients' symptoms. Strengthen training of CINV nurses, including awareness of highly emetic chemotherapy (HEC) and moderate emetic chemotherapy (MEC) regiments, the role of patient-related factors, and the importance of optimal preventive care.

4.6. Health Education

Life and psychological education for patients and their caregivers, such as wearing loose clothes, resting when tired, avoiding eating that causes stomach upset, paying attention to the amount of food, etc., can help patients relieve the discomfort of nausea and vomiting, and help reduce the occurrence of CINV. Explain the knowledge about CINV, so that they have a comprehensive understanding of what may happen in the course of treatment and corresponding measures can be given. For patients with excessive anxiety, psychological guidance and, if necessary, antianxiety medication should be given the night before medication. For patients discharged from hospital or at home with oral chemotherapy drugs, attention should be paid to strengthening education, informing adverse drug reactions and precautions, treating symptoms appropriately when symptoms are serious, and making corresponding adjustments to the next cycle of chemotherapy prevention and antiemetic program.

5. Conclusion

This study summarized the best evidence from 6 aspects in the assessment and management of chemotherapy-related nausea and vomiting in cancer patients, providing evidence-based evidence for medical staff. However, it cannot be directly replicated in the clinic. Therefore, it is necessary to analyze the promoting factors and impediments to the application of evidence by medical staff in combination with the existing environment of the undergraduate room and the will of patients, consider the suitability and feasibility of each piece of evidence, and extract local evidence and apply it in clinical practice to reduce the incidence of

chemotherapy related nausea and vomiting in cancer patients and improve the quality of care. Although the evidence summary of this study was formulated in strict accordance with evidence-based methodology, there were still recommendations based on expert consensus or lower-level evidence, so it is necessary to carry out high-quality original research to enrich the evidence.

Acknowledgements

This study was supported by Nursing elite talent pool of Shanghai Pulmonary Hospital (HL-C3) and Nursing elite talent pool of Shanghai Pulmonary Hospital (HL-C4).

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Chasen, M. and Bhargava, R. (2012) Gastrointestinal Symptoms, Electrogastrography, Inflammatory Markers, and PG-SGA in Patients with Advanced Cancer. *Supportive Care in Cancer*, **20**, 1283-1290. https://doi.org/10.1007/s00520-011-1215-8

[2] Yang, J.F. and Shen, Y.Q. (2019) Progress in Prevention and Treatment of Chemotherapy Related Nausea and Vomiting. *China Journal of Modern Medicine*, **26**, 32-35.

[3] Wang, X.Q., Duan, P.P., Zhang, X.Q., *et al.* (2014) Investigation on the Knowledge and Clinical Practice of Chemotherapy Induced Nausea and Vomiting in Oncology Nurses. *Journal of Nursing*, **11**, 23-25.

[4] Genc, A., Can, G. and Aydiner, A. (2013) The Efficiency of the Acupressure in Prevention of the Chemotherapy-Induced Nausea and Vomiting. *Supportive Care in Cancer*, **21**, 253-261. https://doi.org/10.1007/s00520-012-1519-3

[5] Shea, B.J., Reeves, B.C., Wells, G., *et al.* (2017) AMSTAR 2: A Critical Appraisal Tool for Systematic Reviews That Include Randomised or Non-randomised Studies of Healthcare Interventions, or Both. *BMJ*, **358**, j4008. https://doi.org/10.1136/bmj.j4008

[6] Wei, D., Wang, C.Y., Xiao, X.J., *et al.* (2013) Guidance Research and Evaluation (AGREEII) Tool Example Interpretation. *Chinese Journal of Evidence-Based Pediatrics*, **8**, 316-319.

[7] Brouwers, M.C., Kho, M.E., Browman, G.P., *et al.* (2010) AGREE II: Advancing Guideline Development, Reporting and Evaluation in Health Care. *Canadian Medical Association Journal*, **182**, E839-E842. https://doi.org/10.1503/cmaj.090449

[8] Gu, Y., Zhang, H.W., Zhou, Y.F., *et al.*(2018) Quality Evaluation Tools for Different Types of Research in JBI Evidence-Based Health Care Center: Methodological Quality Evaluation for Systematic Review. *Nurse Education Journal*, **8**, 701-703.

[9] Hu, Y. and Hao, Y.F. (2018) Evidence-Based Nursing. People's Medical Publishing House, Beijing.

[10] Zhu, Z., Hu, Y., Zhou, Y.F., *et al.* (2020) Promoting the Translation of Evidence into Clinical Practice (Evaluation of Literature Quality in Clinical Translation Research of Evidence). *Nurse Education Journal*, **35**, 996-1000.

[11] Wang, Q.C. and Hu, Y. (2015) Evidence Grading and Recommendation Level System of JBI. *Journal of Nursing Educationl*, **30**, 964-967.

[12] Yang, Z.S., Xu, N.N., Zhan, Y.X., *et al.* (2019) Hospitalized Patients Constraint Management Standardization Body Best Evidence Summary. *Journal of Nursing*, **26**, 31-36.

[13] Shanghai Anti-Cancer Association Cancer Rehabilitation and Palliative Professional Committee (2018) Global Management of Nausea and Vomiting Induced by Chemotherapy. *Chinese Journal of Cancer Research*, **28**, 946-960.

[14] Expert Committee on Rational Drug Use and National Health and Family Planning Commission (2017) Guidelines for Rational Drug Use in Gastrointestinal Malignancies. *Chinese Journal of Rational Drug Use*, **14**, 5-54.

[15] Jiang, W.Q., Ba, Y., Feng, J.F., *et al.* (2019) Chinese Expert Consensus on Prevention and Treatment of Nausea and Vomiting Associated with Cancer Drug Therapy. *Chinese Journal of Advanced Medical Sciences*, **11**, 16-26.

[16] Zhang, Y. (2022) Guidelines for Drug Prevention and Treatment of Nausea and Vomiting Induced by Chemotherapy. *China Journal of Hospital Pharmacy*, **42**, 457-473.

[17] NCCN (2011) NCCN Clinical Practice Guidelines in Oncology, Antiemesis V.3. 2011.

[18] Aogi, K., Takeuchi, H., Saeki, T., *et al.* (2021) Optimizing Antiemetic Treatment for Chemotherapy-Induced Nausea and Vomiting in Japan: Update Summary of the 2015 Japan Society of Clinical Oncology Clinical Practice Guidelines for Antiemesis. *International Journal of Clinical Oncology*, **26**, 1-17. https://doi.org/10.1007/s10147-020-01818-3

[19] Tan, J.Y., Molassiotis, A., Wang, T., *et al.* (2014) Current Evidence on Auricular Therapy for Chemotherapy-Induced Nausea and Vomiting in Cancer Patients: A Systematic Review of Randomized Controlled Trials. *Evidence-Based Complementary and Alternative Medicine*, **2014**, Article ID: 430796. https://doi.org/10.1155/2014/430796

[20] Roila, F., Molassiotis, A., Herrstedt, J., *et al.* (2016) 2016 MASCC and ESMO Guideline Update for the Prevention of Chemotherapy- and Radiotherapy-Induced Nausea and Vomiting and of Nausea and Vomiting in Advanced Cancer Patients. *Annals of Oncology*, **27**, v119-v133. https://doi.org/10.1093/annonc/mdw270

[21] Hesketh, P.J., Kris, M.G., Basch, E., *et al.* (2017) Antiemetics: American Society of Clinical Oncology Clinical Practice Guideline Update. *Journal of Clinical Oncology*, **35**, 3240-3261. https://doi.org/10.1200/JCO.2017.74.4789

[22] Chen, F., Yang, X., Liu, L., *et al.* (2020) Effect of Neiguan Acupoint Compression on Chemotherapy Related Nausea and Vomiting in Cancer Patients. *Nursing Research*, **34**, 1535-1541.

[23] Toniolo, J., Delaide, V. and Beloni, P. (2021) Effectiveness of Inhaled Aromatherapy on Chemotherapy-Induced Nausea and Vomiting: A Systematic Review. *The Journal of Alternative and Complementary Medicine*, **27**, 1058-1069. https://doi.org/10.1089/acm.2021.0067

[24] Wei, T.T., Tian, X., Zhang, F.Y., *et al.* (2020) Music Interventions for Chemotherapy-Induced Nausea and Vomiting: A Systematic Review and Meta-analysis. *Supportive Care in Cancer*, **28**, 4031-4041. https://doi.org/10.1007/s00520-020-05409-w

[25] Yu, S.Y., Yin, J.L., Qin, S.K., *et al.* (2014) Guidelines for the Prevention and Treatment of Vomiting Associated with Tumor Therapy. *Journal of Clinical Oncology*, **19**, 263-273.

[26] Ezzo, J., Streitberger, K. and Schneider, A. (2006) Cochrane Systematic Reviews Examine P6 Acupuncture-Point Stimulation for Nausea and Vomiting. *The Journal of Alternative and Complementary Medicine*, **12**, 489-495. https://doi.org/10.1089/acm.2006.12.489

[27] Takeuchi, H., *et al.* (2016) Japanese Society of Clinical Oncology Clinical Practice Guidelines 2010 for Antiemesis in Oncology: Executive Summary. *International Journal of Clinical Oncology*, **21**, 1-12. https://doi.org/10.1007/s10147-015-0852-1

[28] Majem, M., de Las Peñas, R., Virizuela, J.A., *et al.* (2022) SEOM Clinical Guideline Emesis (2021) *Clinical and Translational Oncology*, **24**, 712-723. https://doi.org/10.1007/s12094-022-02802-1

[29] Dranitsaris, G., Molassiotis, A., Clemons, M., *et al.* (2017) The Development of a Prediction Tool to Identify Cancer Patients at High Risk for Chemotherapy-Induced Nausea and Vomiting. *Annals of Oncology*, **28**, 1260-1267. https://doi.org/10.1093/annonc/mdx100

[30] Gu, L. and Li, J. (2016) The Assessment and Management of Chemotherapy-Induced Nausea and Vomiting among Cancer Patients in a Chemotherapy Ward: A Best Practice Implementation Project. *JBI Database of Systematic Reviews and Implementation Reports*, **14**, 235-246. https://doi.org/10.11124/JBISRIR-2016-2626

[31] Brearley, S.G., Clements, C.V. and Molassiotis, A. (2008) A Review of Patient Self-Report Tools for Chemotherapy-Induced Nausea and Vomiting. *Supportive Care in Cancer*, **16**, 1213-1229. https://doi.org/10.1007/s00520-008-0428-y