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# Meta-Synthesis of Physical and Psychological Experiences During PICC Maintenance in Cancer Patients Undergoing Chemotherapy

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**Abstract:** Objective: To explore the real experience of the maintenance of patients with a central venous catheter (PICC) inserted by peripheral venipentesis, and to provide a reference for improving the quality of life of patients with cancer chemotherapy with catheter indentation and regular maintenance. Methods: Qualitative studies on the real experience of patients with PICC catheterization were searched from domestic and foreign databases from the establishment of the database to November 31, 2024, and the meta-integration method was used to integrate and summarize the study results. Results: A total of 10 studies were included, 63 topics were extracted, 9 categories were summarized, and 3 results were integrated. PICC-induced life behavior change, skin stress reaction and economic cost consideration (life disturbance caused by PICC, unpleasant experience caused by film, economic pressure), from patient to nursing: Chain reaction factors of PICC maintenance risk (lax patient self-management, nurses worried about overprotective family members, nursing professional deficiencies, and education gaps): The maintenance and integration results of 3 PICC catheters: the trigger of PICC maintenance risk, multi-factor psychological stress, family nurse support and education difficulties analysis (psychological stress under PICC multi-factor and role transformation during the treatment interval, PICC maintenance experience, family support. Conclusion: During the use of PICC (Peripherally Inserted Central Catheter) for tumor chemotherapy patients, they are faced with issues such as the curling of the dressing. In order to enhance the patients' treatment effectiveness and quality of life, comprehensive considerations are required. By strengthening the training of nurses, optimizing health education, improving the awareness and compliance of patients and their families, enhancing the maintenance experience, and reducing the economic burden, we can address the numerous problems that occur during the use of PICC.

**Keywords:** PICC; Qualitative study; Evidence-based Nursing; Meta

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## 1. Introduction

A peripherally inserted central catheter (PICC) is a technique that involves inserting a catheter into the superior

vena cava or inferior vena cava through peripheral veins such as the cephalic vein, basilic vein, and median cubital vein via puncture [1]. The application of this technique effectively reduces vascular damage caused by repeated punctures and chemotherapy drug extravasation [2]. Compared with traditional central venous catheters, PICC offers greater advantages in long-term treatments such as chemotherapy. However, in antitumor treatments with a course exceeding one week, peripheral venous catheters have a relatively short indwelling time and a higher incidence of complications. Due to the strong irritant nature of chemotherapy drugs, they can cause vascular inflammation or sclerosis, increasing the difficulty of subsequent venous punctures, while the use of PICC can significantly reduce the direct irritation of chemotherapy drugs on blood vessels. The indwelling time of PICC typically ranges from one week to one year, and catheter maintenance is required every seven days [3]. In addition to physiological impacts, the indwelling process of PICC also significantly affects patients' psychological states. Long-term catheterization may trigger a series of psychological reactions such as anxiety, discomfort, restricted social interaction, and concerns about infection, thereby affecting patients' quality of life and treatment compliance. Therefore, paying attention to patients' subjective experiences during catheter maintenance, especially their psychological and emotional feelings, is of great significance for optimizing nursing services. Therefore, this study employed systematic retrieval and Meta-integration methods to conduct a qualitative meta-integration on the real experiences of patients after peripherally inserted central catheter (PICC) placement [4], aiming to deeply analyze patients' multidimensional experiences during catheter maintenance and provide evidence-based support for clinical formulation of individualized nursing intervention plans.

## 2. Materials and methods

### 2.1. Search strategy

This study systematically searched major Chinese and English databases, including English databases: PubMed, Web of Science, Ovid, SinoMed, Cochrane Library, FMRS, NEJM, Engineering Village (EI), ScienceDirect, SpringerLink, ProQuest, and Wiley; as well as Chinese databases: CNKI, Wanfang Database, and VIP Database. The Chinese search terms include: "Peripherally Inserted Central Venous Catheterization," "PICC," "qualitative research," "qualitative investigation," "phenomenology," "grounded theory," "interview," etc.; English search terms include: "Peripherally Inserted Central Catheter," "PICC," "qualitative research," "qualitative investigation," "phenomenology," "grounded theory," "interview," etc.

### 2.2. Inclusion and exclusion criteria

Inclusion criteria: (1) Research subjects: Qualitative studies focusing on the multidimensional experiences of patients with PICC catheterization during the catheterization period; (2) Research themes: Emphasis on patients' physiological and psychological experiences and social support needs during catheter maintenance; (3) Research methods: Utilization of standardized qualitative research methods such as phenomenological research, grounded theory, and ethnography.

Exclusion criteria: (1) Literature quality: Exclude literature with a methodological quality rating of C (based on the JBI quality appraisal criteria for qualitative research); (2) Literature characteristics: Exclude research reports that are duplicate publications or have incomplete data reporting; (3) Language restrictions: Literature not published in Chinese or English will not be included; (4) Availability: Literature for which full text cannot be obtained through multiple channels of retrieval.

## 2.3. Literature screening and data extraction

Import the literature into Zotero to exclude duplicate articles; based on the inclusion and exclusion criteria, read the titles and abstracts to exclude literature irrelevant to the topic; carefully read the full text for further screening; the main content of data extraction includes: author, country, publication year, qualitative research method, research subjects, phenomena of interest, main findings, etc. Two researchers who have received qualitative research training will independently conduct literature screening and data extraction, and cross-check the results. In case of disagreements, both parties will discuss or involve a third party for resolution.

## 2.4. Literature quality assessment

The quality of the literature was evaluated by two researchers according to the 2016 version of the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Qualitative Research [5]. In cases of discrepancies in the evaluation results, discussions between the two researchers or consultation with a third researcher were conducted to reach a resolution. The evaluation encompassed 10 items, and the research quality was classified into three grades: A, B, and C.

## 2.5. Meta-synthesis methodology

The aggregated meta-synthesis method proposed by the JBI Center for Evidence-Based Healthcare in Australia [5] was employed to organize and summarize the findings of the included studies. Through repeated reading, comparison, and analysis of the original literature, the research results were interpreted and synthesized in an aggregated manner to form new categories. The relationships between these categories were further analyzed, ultimately leading to the integration into novel categories.

# 3. Results

## 3.1. Literature retrieval and screening results

A total of 843 relevant articles were identified through database searches. After removing duplicates using Zotero and manual methods, 686 articles remained. Initial screening yielded 21 articles, and after reading the full texts, 10 articles were included in the final analysis [6–15]. See **Figure 1**.

## 3.2. Demographic and methodological characteristics of included studies

The demographic and methodological characteristics of the included studies are presented in **Table 1**.

## 3.3. Methodological quality evaluation of included studies

Ten studies were rated as Grade A, and the rest were rated as Grade B. See **Table 2**.

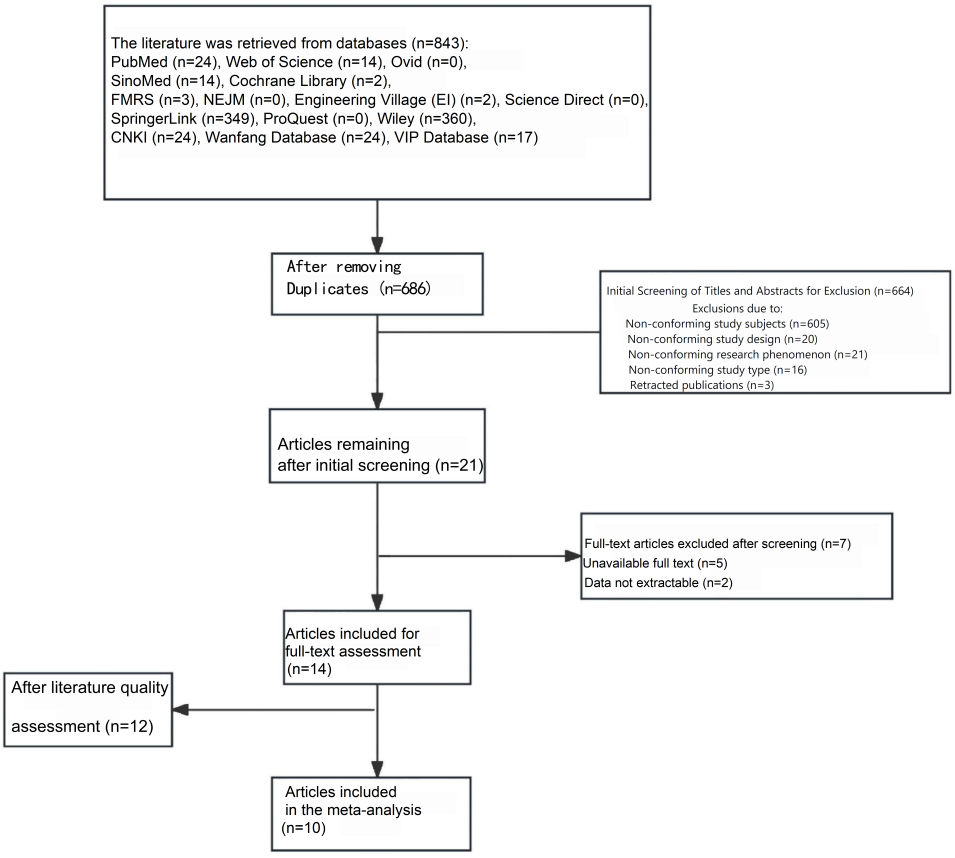


**Figure 1.** Literature screening process.

**Table 1.** Demographic and methodological characteristics of included studies ($n$ = 10)

| Included Study | Year | Country | Qualitative Method / Data Collection | Participants | Phenomenon of Interest | Main Results / Themes |
|---|---|---|---|---|---|---|
| Duan Jingrui et al. [8] | 2018 | China | Phenomenology / Semi-structured interviews | 10 | Real experience of gynecological oncology patients with PICC at different stages | Theme 1: During catheter placement (fear, tension, physical discomfort); Theme 2: During treatment (skin allergy, itching, blisters; sense of benefit); Theme 3: During treatment intervals (inconvenience of maintenance; economic pressure) |
| Li Jieping et al. [15] | 2018 | China | Phenomenology / Semi-structured interviews | 11 | Psychological experience of chemotherapy patients before and after PICC placement | Theme 1: Pre-placement (fear of PICC; inconvenience of living with the line; distrust of medical staff; insufficient maintenance convenience); Theme 2: Post-placement (acceptance of the PICC; actively learning about PICC; untimely line maintenance) |
| Shang Liyan et al. [9] | 2014 | China | Phenomenology / Semi-structured interviews | 18 | Self-management experience of PICC catheters during chemotherapy intervals | Theme 1: Problems and troubles during carrying the PICC catheter; Theme 2: Positive aspects in the self-management process |

**Table 1 (Continued)**

| Included Study | Year | Country | Qualitative Method / Data Collection | Participants | Phenomenon of Interest | Main Results / Themes |
|---|---|---|---|---|---|---|
| Li Quanlei et al. [13] | 2012 | China | Phenomenology / In-depth structured interviews | 20 | Real experience of cancer patients choosing PICC retention | Theme 1: Main sources of PICC information; Theme 2: Subjective willingness, trade-offs, and decision-making; Theme 3: Worries and concerns; Theme 4: Mindset when signing informed consent; Theme 5: Considerations and feelings about subsequent maintenance |
| Yang Qiuyan et al. [6] | 2020 | China | Phenomenology / Semi-structured longitudinal in-depth interviews | 14 | Longitudinal experience of cancer patients throughout the PICC catheterization period | Theme 1: Early experience with the catheter; Theme 2: Experience during catheterization; Theme 3: Experience when complications occur; Theme 4: Experience after catheter removal |
| Gao Yan et al. [10] | 2020 | China | Phenomenology / Semi-structured in-depth interviews | 10 | Real experience of breast cancer chemotherapy patients with PICC retention | Theme 1: PICC selection and decision-making; Theme 2: Worries and concerns; Theme 3: Impact on daily life; Theme 4: Considerations and feelings about later maintenance |
| Xu Pan et al. [14] | 2017 | China | Phenomenology / In-depth structured interviews | 15 | Experience of PICC catheterization in patients undergoing chemotherapy | Theme 1: Discomfort (foreign body sensation, pain, bleeding, redness/ swelling); Theme 2: Dressing allergy, skin itching, blisters; Theme 3: Inconvenience in life; Theme 4: Inconvenience of maintenance; Theme 5: Economic pressure; Theme 6: Confusion |
| Zhang Ming et al. [7] | 2014 | China | Phenomenology / Semi-structured interviews | 11 | Real experience of cancer patients during PICC retention | Theme 1: Feeling physical changes; Theme 2: Maintenance feelings during retention; Theme 3: Impact on daily life; Theme 4: Perceived sense of benefit |
| Zhu Ping et al. [11] | 2016 | China | Phenomenology / Semi-structured interview guide | 10 | PICC catheterization experience of cancer patients | Theme 1: Negative emotional experience of PICC catheterization; Theme 2: Positive experience of PICC catheterization; Theme 3: Suggestions from cancer patients with PICC |
| Paula Para-Bravo et al. [12] | 2018 | Spain | Qualitative Phenomenology / Semi-structured interviews | 18 | Living with a PICC: perspective of cancer outpatients | Living with a PICC line; Adapting to life with the catheter |

**Table 2.** Methodological quality evaluation results of included studies ($n$ = 10)

| Included study | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Overall grade |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Duan Jingrui et al. [8] | Y | Y | Y | Y | Y | N | Y | Y | N | Y | B |
| Li Jieping et al. [15] | Y | Y | Y | Y | Y | N | N | Y | N | Y | B |
| Shang Liyan et al. [9] | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | B |
| Li Quanlei et al. [13] | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | B |
| Yang Qiuyan et al. [6] | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | B |

**Table 2 (Continued)**

| Included study | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Overall grade |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Paula Para-Bravo et al. [12] | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | A |
| Gao Yan et al. [10] | Y | Y | Y | Y | Y | N | Y | Y | N | Y | B |
| Xu Pan et al. [14] | Y | Y | Y | Y | Y | N | N | Y | N | Y | B |
| Zhang Ming et al. [7] | Y | Y | Y | Y | Y | N | N | Y | N | Y | B |
| Zhu Ping et al. [11] | Y | Y | Y | Y | Y | N | N | Y | N | Y | B |

Note: 1. Consistency between philosophical foundation and methodology; 2. Consistency between methodology and research questions or objectives; 3. Consistency between methodology and data collection methods; 4. Consistency between methodology and the representativeness of research subjects, as well as the data analysis methods applied; 5. Consistency between methodology and the interpretation of results; 6. Clarification of the researchers' own backgrounds, including cultural context and values; 7. Has it elaborated on the impact of researchers on the study, as well as the impact of the study on the researchers; 8. Are the research subjects typical and do they fully represent and reflect the subjects and their viewpoints; 9. Does the research comply with current ethical standards; 10. Are the conclusions drawn from the analysis and interpretation of the data.

## 3.4. Meta-integration results

Through in-depth analysis and repeated coding of the 10 included articles, the researchers ultimately extracted 64 initial codes, which were then summarized and integrated into 9 thematic categories. These were finally integrated into three PICC catheter maintenance integration results: lifestyle and behavioral changes triggered by PICC, considerations of skin stress reactions and economic costs, and a chain reaction of factors in PICC maintenance risks from patients to caregiving, as well as the collaborative maintenance by family members and healthcare professionals to support patients' transition, as shown in **Figure 2**.

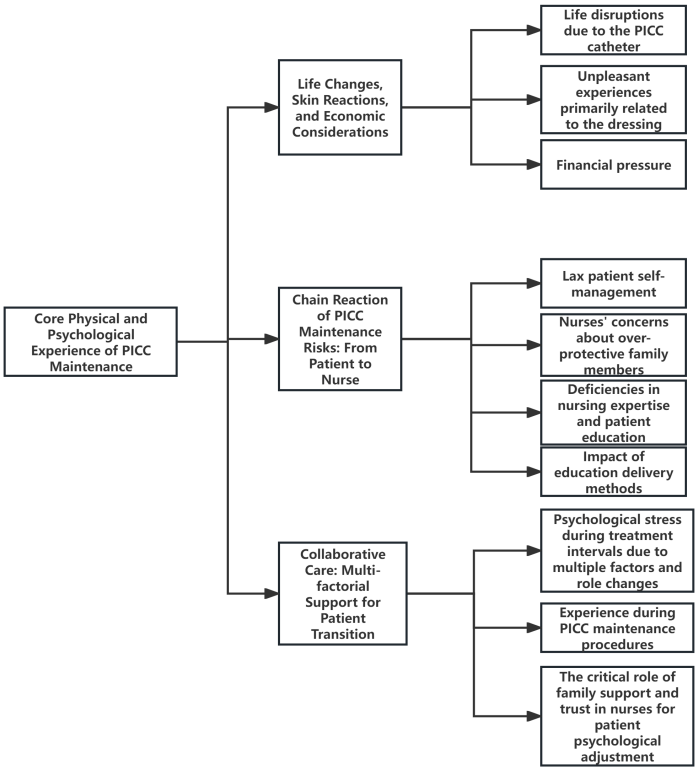


**Figure 2.** Integration results.

### 3.4.1. Integration result 1

Category (1): Lifestyle Disturbances Caused by PICC: Peripherally inserted central catheter (PICC) placement is performed under ultrasound guidance, with the catheter tip reaching one-third of the superior vena cava, usually placed in the upper arm. The puncture site can lead to disturbances in patients' self-image. Patients may develop timid thoughts about their self-image and abandon their hobbies and social interactions. ("Patient C: 'I feel like people look at me strangely. I used to hang out with them, but now I don't want to go out.' [6]") ("Patient G: 'I used to love playing badminton, but now I can't.' [6]") There are also many lifestyle disturbances, such as during rest ("Case A: 'I'm very careful when I sleep, afraid of pressing on the arm with the catheter and causing problems.' [6]") and when bathing ("One example of this is the integration of the catheter into patients' personal hygiene routines, and the need to modify this routine until they were finally able to adapt. B: 'Every day when I got up, I showered. Now, instead of showering every day, I wait a couple of days and I am careful to try and gently wash the arm where the catheter is.' [12]") Some patients have physical disabilities and face numerous inconveniences in PICC maintenance and treatment (Case 9: "I already have mobility issues, and having to come to the hospital every week to wait in line for dressing changes means I have to ask my child to take time off work. It would be great if there were home services available [15]").

Category (2): Unpleasant experiences due to dressings. Different hospitals have different PICC specifications (Patient E pointed out, "When I went to another hospital for a dressing change, they insisted on replacing my small dressing with a large one when they saw it on my hand. They even wrote in my medical record, 'The previous dressing was too small, prone to infection and loosening. It is recommended to use a large one in the future.' I insisted on using the small one, and they made me sign a form before they would change it [7]"). Each nurse's technique varies during the procedure, which can result in a tight dressing that makes the patient uncomfortable (Case G: "The dressing is tight against my skin, and it's very uncomfortable [13]"). The dressing edges curl up ("J said, 'In summer, I sweat a lot, and even though I'm very careful to wrap myself in plastic wrap when I shower, the dressing edges still curl up. I can't not go for a change, and when I get to the hospital, I have to register and wait in line, which always takes half a day [7]"). Due to varying patient reactions, their tolerance to dressings also differs ("Case G: 'I've never been hospitalized before, so I didn't know I was allergic to this thing. There are a lot of red bumps under the dressing, and it's very itchy. It's really torturous [7]"). Allergic reactions to dressings can manifest in many ways, such as skin itching and blisters. After dressing changes are performed under sterile conditions and the condition improves, some patients request catheter removal ("Case B developed an allergic reaction at the dressing site with extensive eczema during the second chemotherapy intermission, close to the third chemotherapy session. The area was disinfected with iodophor disinfectant, and dressings were changed once a day, with gauze covering and securing the puncture site. After three days, there was a significant improvement. However, due to concerns about further blisters if the catheter was retained, the patient requested catheter removal after the third chemotherapy session [13]").

Category (3): Financial burden: The cost of needles left in place for intravenous infusions differs greatly from that of PICC and infusion ports. The regular maintenance costs after PICC catheter placement can be a burden for patients without medical insurance ("A said, 'I don't have medical insurance, and I've already spent a significant amount on treatment. Now, I'm also spending a lot on this catheter, which is a considerable burden [8]'). For retired patients without other sources of income, maintenance costs can also be a significant expense ("B said, 'Because I don't trust small hospitals, my family always brings me to your hospital for maintenance. We now rely solely on our pensions and have no other sources of income [8]').

### 3.4.2. Integration result 2

Category (4): Lax patient self-management: After catheter placement, as patients gradually adapt, they may become lax in self-management (Patient H: "I sweat a lot, and sometimes when the dressing is a bit loose, I use transparent tape to reinforce it on top. It's too much trouble to go to the hospital for dressing changes every day [6]"), leading to delayed maintenance. ("G said, 'We change the dressing every seven days, but sometimes I forget. Once, when I went for a dressing change, it was already two days late, and the nurse said it was fortunate that no infection had occurred [8]') ("Case 2: 'We live in the countryside, and it's 60 li (30 kilometers) to the county town. The township health center can't change the dressing either. It's really troublesome [14]').") Patients may also experience delayed maintenance due to long distances.

Category (5): Nurses' concerns about overprotection by family members: Through health education after catheter placement, family members may be highly compliant. PICC tumor chemotherapy patients can engage in daily activities with the arm where the catheter is placed, but they should avoid raising the arm with the catheter or lifting heavy objects [9]. Appropriate activity is beneficial for promoting blood circulation and preventing venous thrombosis [9].

Category (6): Nursing professional deficiencies and gaps in health education: The trigger for PICC maintenance risks: Inexperienced nurses may lack sufficient knowledge and professionalism in maintenance, leading to adverse consequences ("Patient I had a young nurse who had difficulty managing the contents growing at the PICC puncture site with regular iodine-impregnated cotton swabs and then used a needle to pick at it, accidentally puncturing the PICC tube [9]"). Insufficient or lack of health education by nurses may result in patients not knowing where to go for maintenance when the time comes ("Patient D: 'I didn't know (where to go for maintenance). I never asked [11]'").

Category (7): Factors affecting the form of health education: Factors such as patients' age and educational background can have various impacts, such as on their cognitive ability ("Patient K: 'The nurse told me to apply a hot towel after catheter placement, so I've been doing it continuously. It's been over a month now [9]').") It may also be significantly related to patients' emotional and psychological factors ("Patient L: 'The nurse told me a lot before catheter placement, but now I've almost forgotten it all. At that time, I was just worried that the placement wouldn't be successful and that I'd lose my money. I didn't think much else [9]').") The content of health education may be overly professional ("Patients C, L, P, etc., pointed out that the printed health education materials were 'too professional and hard to understand.'") "I can't even begin to imagine what the complications would be like [9]." Through the care provided by family members and the attention and education given by nurses, psychological issues faced by patients during various stages of chemotherapy and before and after catheter placement can be addressed. This approach also helps establish good relationships between nurses and patients, as well as between patients and their families, thereby eliminating psychological barriers [6].

### 3.4.3. Integrated results 3

Category (8): Psychological Stress Due to Multiple Factors and Role Transitions During Treatment Intervals with PICC: Emotions such as worry and fear arise during treatment intervals ("Patient E: 'I'm afraid the tube will break inside, so I don't dare to move my hand too much. I don't even dare to sleep on this side at night for fear of pressing on the tube. Sigh [6].'") ("Patient D: 'This time it's unblocked, but I'm afraid it will get blocked again in the future. If it can't be unblocked and the tube has to be removed, that would be troublesome [6].'") Allergies to PICC dressings, infections, and intervals between chemotherapy sessions can all evoke negative emotions in

patients, such as worry and anxiety. The transition in family roles from caregiver to care recipient can also trigger negative emotions [10].

Category (9): Patients' Experiences During PICC Maintenance - Local Maintenance Experiences ("Case A: 'After going home, I went to the local hospital for dressing changes. The dressing didn't feel very good; it started to curl at the edges after just two or three days. I think the quality of the supplies used for maintenance at our local hospital isn't very good, so I don't really want to go there for changes [7].'") Patients' feelings on the day of maintenance, such as the large number of patients ("Patient E: 'Coming here every week is really (bitter laugh). You know there are always so many patients [11].'") and long waiting times ("Patient H: 'Every time I come for maintenance, the nurses are busy, and I have to wait for a long time. I also have to pay at the outpatient clinic, which is very inconvenient [10].'") Patients find maintenance cumbersome ("Patient A: 'If I had known it would be this troublesome and take this long, we wouldn't have had it installed [11].'") Of course, other hospitals may have unreasonable requirements. ("Case J: 'I went to our local hospital for dressing changes, but they said they wouldn't change the dressing because the tube wasn't placed (left in place) at their hospital. I had no choice but to ask my son to learn how to do it at the hospital where the tube was placed and then do it for me at home [7].'")

Category (10): The Critical Role of Family Support and Trust in Nurses in Patients' Psychological Adjustment. Patients may experience negative emotions such as anxiety and fear during chemotherapy, during intervals between treatments, before and after catheter placement, etc. Family members can help solve problems or provide assistance to patients, offering psychological comfort (Case J: "No matter whether I'm at home or hospitalized in the hospital, my spouse is always bustling around, taking care of everything so I don't have to worry. Although our conditions aren't great, this feeling is wonderful. I'm truly grateful in my heart [7]"). Patients also have a high level of trust in nurses (Patient F: "The surgery has been done; these are all minor issues. The nurses are taking care of it. I can just leave it to them and feel at ease [9]").

## 4. Discussion

Through the results of the meta-synthesis study, it is learned that the real experiences of cancer chemotherapy patients in maintaining PICC catheters after placement include three integrated findings: lifestyle changes triggered by PICC, considerations of skin stress reactions and economic costs, the chain reaction factors of PICC maintenance risks from patients to nursing care, and the multi-factor assistance of family members and healthcare professionals in facilitating patients' transition.

### 4.1. Efficacy of PICC education: From the perspectives of knowledge acquisition and patient understanding

The results of this study indicate a close relationship between nurses' educational abilities and patients' comprehension abilities, as well as a strong correlation between the intensity of nurses' educational efforts and their mastery of PICC professional knowledge.

(1) There is a lack of solid PICC professional theoretical knowledge: Junior nurses may not have a firm grasp of theoretical knowledge, and their PICC maintenance skills may not meet standard levels. Therefore, it is necessary to regularly conduct formal training to enhance their professional knowledge and skills, especially strengthening standardized training in intravenous infusion [16]. Nurses of all levels of experience should reinforce their PICC-related professional skills training to provide more satisfactory

services to patients.

(2) Nurses' busy work schedules also contribute to inadequate PICC education. Nurses are often too busy during work hours [17] to provide PICC-related education to patients, which in turn affects patients' compliance. Moreover, if nurses are not proficient in the knowledge or explain it too deeply, patients may feel confused or find it difficult to understand PICC maintenance.

(3) Before catheterization, we can conduct education and outreach through accessible methods such as distributing brochures, holding lectures, playing videos, and conducting telephone follow-ups [18] to enable patients to promptly and effectively handle various situations that may arise at different stages, thereby alleviating their anxiety and unease.

(4) Under the medical consortium model, specialist nurses can arrange their schedules to provide outpatient services at primary and secondary healthcare institutions or community clinics. This approach not only increases the number of maintenance points but also reduces the financial burden on patients.

## 4.2. Nursing and psychological intervention for patients with PICC catheterization

In the nursing care of PICC catheterization and maintenance, nurses play a crucial role in alleviating patients' fear.

(1) Social activities and physical limitations: The basilic vein in the middle section of the upper arm, guided by Doppler ultrasound, is considered an ideal site for PICC catheterization [19]. After catheterization, the catheter can be easily concealed by clothing, allowing patients to maintain confidence and engage freely in social activities. However, for some patients with physical limitations, such as difficulty in climbing stairs, PICC maintenance poses significant challenges, further exacerbating their fear.

(2) Excessive control by family members: During PICC maintenance, various factors such as catheter breakage, blockage, film allergy, and infection risks often cause anxiety in patients. This fear can also be transmitted to family members, leading to excessive control over PICC management, such as preventing patients from engaging in appropriate upper limb exercises and functional training like gripping and releasing a stress ball with the punctured side [20], which in turn increases the potential risk of deep vein thrombosis [21] and pulmonary embolism [22]. Therefore, nurses must rely on their rich clinical experience to promptly and accurately assess and address the issues faced by patients. Through professional communication skills [23], nurses should guide patients to fully express their inner thoughts and develop and implement highly targeted psychological counseling plans based on the patients' actual psychological conditions. Meanwhile, nurses should employ professional research methods to delve into patients' current needs and understanding of PICC-related knowledge, accurately identifying the issues that patients are most concerned about. Based on patients' needs for PICC knowledge and drawing on a solid foundation of professional expertise, systematically, comprehensively, and purposefully introduce relevant PICC knowledge, provide accurate and detailed answers to patients' questions, effectively enhance patients' participation in PICC maintenance and the entire treatment process, and assist patients in better coping with diseases and treatments.

## 4.3. Establishing a continuity of care system for PICC outside the hospital

Various factors such as film curling, puncture site bleeding, and catheter breakage, can lead to delayed PICC maintenance, increasing the risk of infection and posing potential threats to patients' health. To effectively improve this situation, it is particularly crucial to establish a continuous care system for PICC catheterization outside the

hospital after patients are discharged [24]. By enhancing patients' self-management and nursing capabilities and integrating efficient continuity of care outside the hospital into the post-discharge rehabilitation nursing process, treatment outcomes can be significantly improved, patients' quality of life can be enhanced, the incidence of complications can be reduced, and post-discharge nursing outcomes for patients can be optimized:

(1) Home care: Given the current imperfect relevant systems in China, patients may experience swelling in the limb with PICC puncture during home care, which does not improve with changes in body position, accompanied by or without swelling, pain, and numbness in the neck and shoulder areas, as well as occasional complications such as "detachment of the infusion connector from the catheter [25]". Therefore, this system still requires in-depth research and further improvement.

(2) Internet + home nursing services: Some medical institutions now offer home services [26], which can reduce issues such as long distances for patients when PICC maintenance is due and the inconvenience for patients with physical disabilities. The nursing team carries professional equipment during home visits and performs standardized operations such as catheter maintenance and dressing changes for patients, avoiding the fatigue of traveling back and forth to the hospital and ensuring treatment continuity.

(3) The medical consortium model. Efforts should be made to vigorously promote the construction of medical consortia and actively carry out the establishment of primary maintenance points, enabling patients to receive professional and effective PICC maintenance services in primary units such as communities and secondary medical institutions. The state needs to increase investment in formulating relevant regulations and personnel training for primary maintenance points, promoting more professional and standardized operations in primary medical institutions [27]. In this way, patients can not only reduce their financial burden but also enjoy a higher-quality maintenance experience.

(4) The application of WeChat platforms: Some medical institutions have utilized WeChat platforms to establish functional modules such as health education and nurse-patient communication. They regularly disseminate concise and clear educational content, including short videos and images, to enhance patients' self-management capabilities and reduce the occurrence of related complications [28].

## 5. Conclusion

In summary, the regular maintenance of PICC catheters in cancer patients undergoing chemotherapy involves multiple aspects, including physiological deficiencies, fear, and comprehension issues. To improve patients' treatment outcomes and quality of life, it is essential to consider these factors comprehensively. This includes strengthening professional training for nurses, optimizing educational content and methods, enhancing the awareness and compliance of patients and their families, improving the maintenance experience, and alleviating the financial burden on patients. By doing so, we can better address the various issues that arise during the use of PICC catheters.

## Disclosure statement

The authors declare no conflict of interest.

## References


[1] Dong X, Yu T, Cao M, et al., 2023, Meta-Synthesis of Qualitative Research on the Real Experiences of Patients With PICC Catheterization. Evidence-Based Nursing, 9(21): 3836–3842.

[2] Guo Y, Xue L, Tang W, et al., 2024, Ovarian Microenvironment: Challenges and Opportunities in Protecting Against Chemotherapy-Associated Ovarian Damage. Hum Reprod Update, 30(5): 614–647.

[3] Sun W, 2022, Construction of a Risk Assessment Model for Peripheral Intravenous Catheter-Related Complications in ICU Patients, thesis, Qingdao University.

[4] Wu X, Zhou Y, Chen S, et al, 2025, Meta-Synthesis of Factors Impeding Dietary Management in Patients With Gestational Diabetes Mellitus. Journal of Nurses Training, 40(05): 530–539 + 544.

[5] Zhang Y, Li X, Wu J, et al., 2024, Interpretation of the Evidence Summary Production Process at the JBI Evidence-Based Health Care Center. Journal of Nursing, 31(16): 39–43.

[6] Yang Q, Lu Q, Ou M, et al., 2020, Qualitative Research on the Longitudinal Experience of Cancer Patients With PICC Catheters. Contemporary Nurse (First Issue), 27(08): 9–12.

[7] Zhang M, Gao W, Sun Y, et al., 2014, Substantive Research on the Real Experiences of Cancer Patients During the Indwelling Period of Peripherally Inserted Central Catheters. Chinese Journal of Nursing, 31(19): 1–5.

[8] Duan J, Jiang W, Cai Y, et al., 2018, Qualitative Research on the Real Experiences of Gynecological Cancer Patients With PICC Catheters at Different Stages. Journal of Integrative Nursing (Chinese and English), 4(07): 76–79.

[9] Shang L, Dong H, Xu X, et al., 2014, Qualitative Research on the Self-Management Experiences of Patients With PICC Catheters During Chemotherapy Intervals. Nursing Research, 28(01): 48–50.

[10] Gao Y, Wang L, 2020, A Qualitative Study on the Real Experience of Breast Cancer Patients Undergoing Chemotherapy With Indwelling PICC. General Practice Nursing, 18(18): 2275–2277.

[11] Zhu P, Liu J, Meng A, et al., 2016, A Qualitative Study on the Experience of PICC Catheterization in Cancer Patients. Nursing Research, 30(17): 2114–2117.

[12] Parás-Bravo P, Paz-Zulueta M, Santibañez M, et al., 2018, Living With a Peripherally Inserted Central Catheter: The Perspective of Cancer Outpatients—A Qualitative Study. Support Care Cancer, 26(2): 441–449.

[13] Li Q, Yan M, Lin C, et al., 2012, A Substantive Study on the Real Experience of Cancer Patients Choosing Indwelling PICC. Journal of Nursing Science, 27(05): 40–42.

[14] Xu P, Hu H, Shao X, et al., 2017, A Qualitative Study on the Experience of PICC Catheterization in Chemotherapy Patients in the Oncology Department. Qilu Nursing Journal, 23(15): 38–40.

[15] Li J, Jiang C, Guan S, et al., 2018, A Qualitative Study on the Psychological Experience of Chemotherapy Patients Before and After PICC Catheterization. Medical Information, 31(05): 164–166.

[16] Chen L, Li J, Yang Y, et al., 2023, Training and Effectiveness of PICC Maintenance for Grassroots Nurses in Guangdong Province. Chinese Journal of Nursing Education, 20(02): 194–199.

[17] Yang M, Ma F, 2021, A Longitudinal Study on the Transfer Behavior and Its Influencing Factors After Standardized Training in PICC Technology. Journal of Nursing Science, 36(05): 59–61.

[18] Xiao S, Zhang X, Chen Q, 2019, Application of Staged Telephone Follow-Up Health Education in Breast Cancer Patients Undergoing PICC Catheterization and Chemotherapy. International Medicine & Health Guidance News, 25(24): 1007–1245.

[19] Li X, Chen K, Zhao J, et al., 2024, Meta-Analysis of the Impact of PICC Placement via Different Upper Limbs on Catheterization Outcomes. Journal of Nursing Administration, 24(10): 887–892.

[20] Ma G, 2023, Research on Risk Factors and Predictive Models for Unplanned Extubation of PICC in Tumor Patients,

thesis, Central South University.

[21] Böll B, Schalk E, Buchheidt D, et al., 2021, Central Venous Catheter-Related Infections in Hematology and Oncology: 2020 Updated Guidelines on Diagnosis, Management, and Prevention. Ann Hematol, 100(1): 239–259.

[22] Bing S, Smotherman C, Rodriguez R, et al., 2022, PICC Versus Midlines: Comparison of Peripherally Inserted Central Catheters and Midline Catheters With Respect to Incidence of Thromboembolic and Infectious Complications. Am J Surg, 223(5): 983–987.

[23] Xiong X, 2023, The Impact of Continuous Nursing Intervention on Patients With Acute Myocardial Infarction After PCI: A Review of "Humanistic Nursing and Communication Skills in the Operating Room". Chinese Journal of Experimental Traditional Medical Formulae, 29(09): 178.

[24] Hao M, Mi J, Xu Z, 2025, Analysis of the Application Effect of Continuous Nursing Pathway in Patients With Tuberculous Meningitis. Chinese Journal of Antituberculosis, 1–9.

[25] Xu L, 2023, Construction and Application of a Risk Early Warning Ability Indicator System for Online-Booked Nurses in Venous Catheter Maintenance Under the "Internet + Nursing Services" Model, thesis, Qingdao University.

[26] Quan S, Hao F, Lai W, et al, 2023, Research on the Effectiveness of "Internet +" Home-Based Nursing Services for PICC Patients. Journal of Nursing Administration, 23(10): 786–789 + 829.

[27] Jing T, Wu S, Peng Y, 2022, Application Research of an Integrated Nurse-Physician Risk Management Model in Patients With Acute Leukemia Undergoing Peripherally Inserted Central Catheter (PICC) Placement. Journal of Chengdu Medical College, 17(01): 124–127.

[28] Liu F, Lv Y, Li D, et al., 2021, The Impact of Self-Care Ability Education and Guidance Based on a WeChat Management Platform on Patients With Stomas in Gastrointestinal Surgery. Chinese Journal of Modern Nursing, 27(26): 3613–3617.