



OPEN

Qualitative study of kinesiophobia in patients with tumors after PICC catheterization

Liangyan Zhang¹, Chen Zhang²✉, Yanfen Yu³, Kesang Li¹ & Hanbing Yan¹

To explore the kinesiophobia experience of patients with tumors after PICC catheterization and to analyze patients' views and true inner feelings about kinesiophobia, with the goal of providing a reference for reducing the occurrence of kinesiophobia and enhancing the experience of patients undergoing this procedure. A purposive sampling method was used to select patients with tumors that required the placement of a PICC line in a tertiary hospital in Ningbo City, Zhejiang Province, as the research object. A semistructured in-depth interview method was used for data collection, and the content of the interview was analyzed through a seven-step analysis method of Colaizzi's phenomenological data. (1) Physiological discomfort after catheter placement leads to kinesiophobia behavior (2) Psychological stress after catheter placement triggers kinesiophobia reactions 3. Catheter information affects kinesiophobia 4. kinesiophobia manifestations were observed in patients during catheter maintenance and home management. kinesiophobia behavior in oncology patients with a PICC line presents multidimensional dynamic evolution characteristics, and its core triggers involve the interaction of physiological reactions, psychological stressors, and daily behaviors, which require more attention and early intervention to reduce potential adverse reactions.

Keywords PICC, Tumor, Kinesiophobia, Qualitative study

According to Global Cancer Data 2022¹, nearly 20 million new cancer cases were diagnosed in 2022. This study covers 183 regions of the world, includes 10 major cancer types, and analyzes the latest trends in tumor incidence. Approximately one in five men or women will develop a tumor in their lifetime, and tumors will be the major impediment to increased life expectancy. The study also shows that the number of new cancer cases in 2050 will reach 35 million. The number of long-term cancer survivors is also increasing rapidly as the state of the art in oncology diagnosis and treatment has improved, and an increasing number of cancer patients are entering a chronic disease state. Peripherally inserted central venous catheters (PICCs) are widely used for long-term chemotherapy, parenteral nutritional support, or blood product infusion in oncology patients and have the advantages of easy and safe operation, protection of peripheral veins, and a reduction in patients' pain from multiple punctures². However, the catheter is fixed in the patient's forearm for a long period of time, the duration of use of the cycle is long, and it can easily cause a decline in the patient's quality of life³. After catheterization, some patients are afraid to perform daily activities or early functional exercises, which leads to an increased risk of thrombosis and reduced limb function⁴. Kinesiophobia refers to an extreme form of fear of exercise, which predisposes patients to adverse consequences such as anxiety, depression, and poor adherence to functional exercise⁵. The incidence of after PICC placement has been reported to be approximately 37% to 53.1%^{6,7}, which is common in oncology patients with PICC placement and requires more attention and early intervention⁸. However, most of the current studies are cross-sectional investigations, and qualitative studies that explore the experience of fearfulness further are rare. Therefore, this study adopted a phenomenological research method to analyze the evolution of kinesiophobia in oncology patients after PICC, with the goal of providing a reference for early intervention in kinesiophobia and the reduction of complications.

¹Hematology Department, Ningbo No. 2 Hospital, Ningbo, Zhejiang, China. ²Intensive Care Unit, Ningbo No. 2 Hospital, Ningbo, Zhejiang, China. ³PICC Department, Ningbo No. 2 Hospital, Ningbo, Zhejiang, China. ✉email: 708911401@qq.com

Methodology

Design and participants

A phenomenological research method was used to observe in depth the changes in the phenomenon of fearful experience after PICC catheterization in patients with tumors. The purposive sampling method was used to select patients with the placement of a PICC line in the oncology ward of a tertiary hospital in Ningbo City, Zhejiang Province, from June to December 2024 as the study subjects. The inclusion criteria were as follows: (1) patients with pathologically confirmed tumor diagnosis; (2) patients with kinesiophobia as determined by the Tampa Scale for Kinesiophobia-17 (TSK-17) (TSK score > 37)⁹; (3) patients whose upper limb serves as the PICC insertion site; (4) patients who voluntarily participated in this study and were > 18 years old; (5) patients who were conscious and possessed basic reading and communication skills. The exclusion criteria were as follows: patients with severe mental illness or cognitive disorders. Shedding criteria: who withdrew automatically during the interview. Sample selection followed the principle of maximum difference, which was reflected in different ages, genders, types of catheters, lengths of tubing, number of times with tube placement occurred, complications, etc. Sample size followed the principle of saturation of qualitative research data; no new themes emerged from the interview data, and it could be ended after saturation was reached. Finally, 14 representative patients were included in the study, numbered “N1” to “N14”. The basic information of the study subjects is shown in Table 1.

Data collection

The patients signed an informed consent form and completed a basic information questionnaire and the TSK-17 scale prior to the interview. The Tampa Scale for Kinesiophobia (TSK-17) is widely used in the assessment of kinesiophobia. It has 17 questions, each scored between 1 and 4. The final score ranges from 17 to 68, with a score of 37 or more indicating kinesiophobia and higher scores indicating more severe kinesiophobia. The researcher preinterviewed 2 patients before the formal interview and amended the interview outline. The specific interview outline was as follows: ① How do you feel after PICC catheterization? ② Did it affect your arm movement? How was it affected? ③ What factors affect your functional exercise? ④ Did you encounter any difficulties in the process of exercise after PICC placement? ⑤ What kind of help do you need from us to perform your functional exercise after tube placement? During the in-depth interviews, we reflected, recorded the research situation of the patient, and set up additional interview outlines. ⑥ Did different nurses bring different changes to your functional exercises or daily life after care? ⑦ How did you develop the habit of functional exercise? The interview site was chosen as a place that was as quiet and undisturbed as possible for the convenience of the interviewees, usually the treatment room or ward of the ward. The interview format was face-to-face, the one-to-one semistructured interview method was used, and the interview time ranged from approximately 15–40 min.

Data analysis

This study used the Colaizzi seven-step¹⁰ analysis method of phenomenological research, with the following steps: (1) the researcher familiarized herself with the information provided by each respondent through repeated readings; (2) the information was analyzed word by word, identifying and excerpting statements relevant to the study; (3) we systematically coded recurrent viewpoints while bracketing the researcher's inherent presuppositions and value judgments throughout the analytical process; (4) we searched for meaningful common concepts to form theme prototypes; (5) we described each theme in detail and extracted typical original descriptions; (6) we identified similar ideas and condensed them into themes; (7) we returned the thematic structure to the study participants for validation. The results of the TSK-17 scale were analyzed using descriptive statistics.

| Num | Tumor type | sex | age | Catheter type (lumen) | Number of times with tube | length of time(week) | complication | TSK |
|-----|------------|--------|-----|-----------------------|---------------------------|----------------------|------------------------|-----|
| N1 | LYMPHOMA | Female | 52 | Single | 1 | 50 | No | 58 |
| N2 | PAAD | Female | 65 | Single | 1 | 11 | No | 45 |
| N3 | MDS | Female | 63 | Single | 1 | 33 | infections | 47 |
| N4 | AML | Female | 47 | Single | 1 | 12 | Bleeding, thrombosis | 56 |
| N5 | LYMPHOMA | Male | 31 | Single | 3 | 8 | No | 49 |
| N6 | MM | Male | 59 | Single | 1 | 8 | psoriasis | 44 |
| N7 | AML | Male | 55 | Single | 1 | 28 | Infections, thrombosis | 46 |
| N8 | LYMPHOMA | Male | 54 | Single | 2 | 34 | Infections | 44 |
| N9 | LYMPHOMA | Female | 53 | Single | 1 | 17 | plug | 45 |
| N10 | AML | Female | 59 | Double | 2 | 13 | No | 51 |
| N11 | LYMPHOMA | Female | 63 | Single | 1 | 17 | No | 48 |
| N12 | LUSC | Male | 61 | Single | 1 | 12 | Bleeding | 48 |
| N13 | STAD | Female | 79 | Single | 1 | 21 | psoriasis | 57 |
| N14 | LYMPHOMA | Female | 70 | Single | 1 | 20 | plug | 46 |

Table 1. Basic information of the subjects (N=14) Note: LYMPHOMA(cancer that affects the lymphatic system), PAAD[‡]pancreatic adenocarcinoma[‡], MDS[‡]myelodysplastic syndromes[‡], MM[‡]multiple myeloma[‡], AML[‡]acute myeloid leukemia[‡], LUSC[‡]lung squamous cell carcinoma[‡], STAD[‡]stomach adenocarcinoma[‡].

| Themes | Subthemes |
|--|--|
| (1)Postcatheterization physiological discomfort-induced kinesiophobia. | (1)Initial pain (2)Bleeding after tube placement (3)Postplacement blood clots (4)Foreign body sensation and constriction sensation (5)Cardiac discomfort after activity |
| (2)Psychological stress after tube placement triggers kinesiophobia reactions | (1)The catheter was neglected due to the disease (2)Fear of initial catheterization |
| (3) Catheter information affects kinesiophobia | (1)The information transmission has deviations (2)Information overload leads to psychological stress (3)Access to information during catheter maintenance to reduce Kinesiophobia |
| (4)Manifestations of kinesiophobia in catheter maintenance and home management | (1)Functional limitations in life (2)Catheter maintenance details affect activities (3)Influence of others' experiences on kinesiophobia (4)Illness or unexpected events exacerbate kinesiophobia (5)Family Constraints & Support. (6)Sensitization and adaptation processes to the arm (7)Adaptation to sleep |

Table 2. The categories and subcategories of the study.

Quality control

(1) General information questionnaire and TSK-17 scale collection: The data were distributed and collected on the spot by one researcher during hospitalization, with appropriate explanations for those who had doubts, and the completeness of the answers was checked at the time of retrieval. (2) Interview data collection: All participants in the study were professionally trained in qualitative research, and the selection of the research subjects was made by maximizing the differentiation, trying to make the samples with different characteristics evenly distributed, and giving full consideration to the representativeness of the sample. The audio-recorded data were converted into sentence-by-sentence text within 24 h of the collection of each set of interview data, and nonverbal information such as the time of the interview, the tone of voice, expression, and movement of the interviewee were recorded. The researcher was a responsible nurse in the ward who established good trust and friendly relationships with patients, took the initiative to participate in patients' PICC care, extended the contact time with patients to reduce the influence of the researcher, and reduced the Hawthorne effect. (3) Data analysis: Data collection and analysis were carried out synchronously, with each of the 2 researchers on the team listening to the audio recordings and reading the text information repeatedly, independently summarizing the statements of significance, and summarizing the text of the statements.

Ethics

The study was reviewed and approved by the Ethics Committee of Ningbo No.2 Hospital (YJ-NBEY-KY-2022-102-01). The study subjects signed an informed consent form, all methods were performed in accordance with the relevant guidelines and regulations.

Results

An interpretive understanding of kinesiophobia experiences was constructed in this study. The analysis yielded four categories and eighteen subcategories (Table 2).

Theme 1: postcatheterization physiological discomfort-induced kinesiophobia

Some patients experienced pain, bleeding, and thrombosis after tube placement, which produced significant foreign body and binding sensations, as well as cardiac discomfort after activity, all of which contributed to the initial phobic behavior after tube placement.

(1) Initial pain.

N2: "It just started to hurt, yeah, just took the gauze off, it's fine on the third day." N3: "I didn't lift the hot water bottle. and I don't lift it now. When I first hit it, I lifted a hot water bottle of water. I went to get it with my right hand, then the next day it hurt, so I didn't dare to lift it."

(2) Bleeding after tube placement.

N4: "I have special platelets, low platelets, ordinary blood draw I have to press for 10 minutes or so, you guys changed the cotton gauze for me, and said that the blood seepage is very bad, I don't dare to move."

N12: "There was blood in the beginning... afraid of bleeding, the first time I just did a good job bleeding, I'm afraid of bleeding again the second time, scared to death, bleeding scared to death, so this hand is even more afraid to move."

(3) Postplacement thrombosis.

N7: "In the beginning it was practiced, then not practiced, there was a period of time that I had a thrombus in my hand, got a thrombus, are restricting activities."

(4) Foreign bodies and binding sensations.

N1: "It feels like there's something in here, hard, kind of not very natural kind of thing." N9: "It just feels like I'm immobilized in my arm, it feels a little bit like I'm being bound."

N4: "I just felt an uncomfortable, pulling on the tendon like feeling here (indicating position)."

N14: "This hand will be numb, numbness in the hand, it will be a little numb, numb."

(5) Cardiac discomfort after activity. Discomfort in the heart after activity limits further movement.

N7: "Sometimes after activity it feels a little bit as if my heart will contract violently and I lie down or sit or lie still."

N9: "Sometimes I don't know if it's my heart, but after activity it feels like my heart is a little bit uncomfortable, the tube gets sucked in like that and it feels like it's sad when it jerks a little bit, for a while and when it hurts and the hand stops moving, I just stroke and stroke with my own fingers on the side to give him a little bit of relief."

Theme 2: psychological stress after tube placement triggers kinesiophobia reactions

Different psychological stressors caused by bewilderment at the time of disease diagnosis, fear after catheterization, . . .

(1) The catheter was neglected due to the disease. Neglect of catheterization due to diagnosis of diseases. Some patients reported that nervousness, anxiety, and confusion when the disease was first diagnosed neglected information about the catheter, resulting in reduced limb activity.

N5: "At the beginning, to be honest, the disease was just diagnosed soldiering on, and a lot of things won't be looked at carefully. Listening to the dictation, hearing it and probably forgetting it. Then, it's more nervous, paying attention in every way, it makes the body seem stiff that way."

N13: "I neglected it. At that time, I had just been sick and emotionally bad... people's mood suddenly changed off all of a sudden, and I couldn't accept it."

(2) Fear of first tube placement. PICC catheterization is inherently an invasive procedure. Patients commonly exhibit signs of anxiety and avoidance behaviors during their first catheter placement. However, as the number of catheterizations increases and experience accumulates, their fear significantly diminishes, accompanied by a corresponding reduction in kinesiophobia.

N7: "At that time, I was a little bit scared in my heart when I went on (to get the tube), so I said that I didn't lift anything in general, and occasionally I just lifted some garbage bags and all these, and I didn't move anything else."

N9: "When I was hitting it all I felt there was tension, there was a little bit of feeling that it was a little bit tense to have this thing inserted, anyway, the first month it felt like that, I didn't dare to move around." Three respondents whose tumors recurred some time after the end of chemotherapy and who needed to be retubed for another treatment, had greater than 2 experiences with tubes, and had significantly less fear when the tubes were placed.

N5: "And then by the second time after having a little bit of experience, it would be a little bit more relaxed, and then it would be adapted to a little bit more quickly. At the beginning, because I was a little bit afraid, I felt that maybe the tube would be in the body, in case it was just afraid of breaking when I did certain movements, and I would have that worry, and then it got better."

Theme 3: catheter information affects kinesiophobia

The education content for some patients regarding the PICC line is relayed by family members, resulting in a partial lack of information about the PICC line, and patients' understanding of the catheter is insufficient, resulting in a sense of unfamiliarity and fear.

(1) The information transmission has deviations. The information related to catheter maintenance was conveyed by family members, and the inadequate understanding of such information triggered kinesiophobia.

N1: "The first thing I felt was that it was very strange, what is this thing. Then, my sister came and told me, she said it's a PICC tube and how to protect it properly, that's what my family told me. So, at first definitely nervous, fearful, kind of fearful, and uneasy in my mind, that was the initial stage."

N6: "My daughter told me, it's this book (PICC maintenance book), (told me) which thing can't be messed up, and I didn't do it, I didn't move it."

(2) Information overload leads to psychological stress. Other patients reported that health promotion was too much at once and that information overload led to psychological stress.

N1: "She told me I have to protect it or what problems will occur, and I got stressed out inside, scared, fearful, and afraid to move."

N5: "At first, because I was a little bit afraid (a lot of precautions were told), I felt that maybe the tube would be in my body, and in case it was just a fear of breaking when I did certain movements, I would have that fear."

- (3) Access to information during catheter maintenance to reduce Kinesiophobia. Weekly catheter maintenance, along with the meticulous operations and repetitive education by nursing staff, can alleviate patients' fear of movement.

N1: "You are gentle or soft, or you tell me how it looks while you are doing it, my heart will feel very comforted."

N5: "People change the tube very carefully, and then disinfect everything very carefully, and make all the sticky adhesive very clean next to it, and also usually disinfect the tube and chat with the nurses, and after learning about the PICC, I feel much more at ease." N9: "She was especially careful, really, she got especially careful... every time she had to instruct you once (including how to move your body)."

Some patients expressed that exercise needs to be reminded and supervised from outside, especially in the case of elderly patients or those who are prone to slacking off, and that continuous supervision can help them better adhere to the exercise and recognize the importance of functional exercise.

N1: "You start from today, how should you move your hand. And also remind him repeatedly so that he knows that this thing you have (doing functional exercise) is important to him. If you pass it off people won't remember it and they won't take it seriously."

N13(A 79-year-old elderly patient)said: "Your promotional materials are for me, give me have no heart to read, eyes are also spent, the brain is also confused."

N11: "Yes, this thing if sometimes is lazy, this hand is lazy, get a few times did not get, there is to get did not get, today you gave me said, every day to three to five hundred Under, I definitely listened to it, today you have this good reminder."

Theme 4: manifestations of kinesiophobia in catheter maintenance and home management

Catheter maintenance and home management are key components to ensure a smooth recovery process for patientsHowever, due to a variety of factors, patients often experience kinesiophobia during these sessions.

- (1) Functional limitations in life. Patients avoid daily activities such as lifting heavy objects, doing housework and bathing for fear of damage to the catheter, resulting in loss of normal life functions. Some patients are fearful and inconvenienced by bathing with the tube, worrying about water or damage to the catheter.

N1: "Bathing is a burden after the tube is in place."

N2: "How much does the hot water bottle weigh, can I lift it? I don't dare to lift it. If I (PICC tube) popped out, it would be the end of me. I don't cook, the old man cooks, I don't even mop the floor, I'm afraid it's not good for this thing."

N8: "It affects my work, well this year there is not much work inside the factory... (after hitting the pipe) I still use my left hand to operate for the first time."

N14: "I used to work out all the time, but now I don't work out after I get sick."

- (2) Catheter maintenance details affect activities. Patients were very sensitive to the details of catheter maintenance, such as the firmness of the dressing and the disinfection process, and were worried that improper handling would lead to catheter dislodgement or infection.

N7: "It says that if you wait for the disinfectant to dry and then put it on again, it will be firmer or else it will be a problem if I go back to it and take it off. Some nurses stick it to you a little bit more firmly, some change it if it doesn't stick firmly, it's easy to fall off. That all affects the activity."

N8: "But I think it's easy to fall off when I put a dressing here, I think this is not sticky... It definitely has an impact on the activity."

- (3) Influence of others' experiences on kinesiophobia. Negative guidance from others may lead to kinesiophobia behavior; however, positive guidance can act as a positive role model.

N3: "She was doing morning exercises, she was also pierced (punctured) in October last year, I said look I didn't run out at all, she (tube) ran for a long time, I said I can't lift it, and I can't do this exercise, and I can't widen the scope of this hand."

N7: "I once, if I was over there, I saw a person with an infected catheter, and it was scary to watch us, just for fear of messing it up."

N13: "This ball, I saw the guy next door squeezing it here, and I asked my son to buy it. Since I bought this ball, I basically pinch it here every day."

- (4) Illness or unexpected events exacerbate kinesiophobia. Special events such as car accidents and adverse reactions to chemotherapy may exacerbate kinesiophobia behaviors.

N3: "After the car accident, I called a babysitter and stayed in bed, and my ribs couldn't turn around at all, they were all flat on their backs, and I couldn't tug at them at all."

N4: "If there's pain, numbness, bloating, aches and pains or discomfort in one's own body, like I've got a fever, it's 39 degrees today or something, it's very difficult for that person, those may affect."

N12: "I don't want to move when I have chemotherapy, I'm tired and lazy."

- (5) Family Constraints & Support. Some patients reduced their activities or even avoided exercise altogether because of overprotection by their family members.

N6: "I didn't go to do (those chores) either, I didn't move, my wife and daughter didn't want me to move, my wife didn't let me get tired."

N7: "Since I have been in the hospital, didn't work, have been recuperating from this disease, so that's why I didn't mention anything about things in general."

(6) Sensitization and adaptation processes to the arm. Patients were very sensitive to the catheterized arm in the early stage of tube placement and avoided touching or overactivity.

N1: "Just after I got it done, the first 4 months and 5 months like this, the hand was afraid to lift up, and then, for example, if you walk with me, I will ask you to walk this way, and don't you touch me here (the arm on the side of the tube placement), and don't touch me with this hand."

N10: "When I roll over, my hand (tube placement arm) hurts when I roll over with it. I just flatten my hand right away, and it slowly gets better again."

(7) Adaptation to sleep. Patients adjusted their sleeping position for fear of pressing on the catheter and even used aids to protect the catheter.

N6: "I'm used to sleeping like this now too, no pressure."

N9: "Because it can only sleep against this side, not even if I sleep more, I am afraid of pressing it (PICC tube), seeing that I twist myself over, I also have to put something on my arm to protect it."

Discussion

Pain, bleeding, thrombus, foreign body sensation, and constriction are common complications after PICC placement and directly affect the daily activities of patients. In this study, pain and bleeding in the early stage of tube placement reduced arm activity in 2 patients, and pain was generally in the early stage of tube placement, which is generally consistent with the findings of Li Jinhua et al.¹¹, who reported that pain and bleeding can significantly limit the range of patient activity and may also lead to psychological anxiety and fear. Notably, in high-risk patients with combined thrombocytopenia or coagulation abnormalities, routine hemostatic measures may be insufficient to prevent bleeding events. For this population, prolonging the time of puncture point compression (e.g., ≥ 15 min) and supplementing it with elastic bandage pressure bandages in clinical care are recommended, and the use of alginate excipients can effectively prevent and reduce blood seepage after PICC placement in patients with platelet hypoplasia¹². Moreover, the weight-bearing and large flexion and extension movements of the affected arm should be strictly limited within 24 h after tube placement. In addition, health care personnel should dynamically observe the bleeding situation at the puncture point, adjust the interventions in a timely manner, perform the relevant explanatory work, and alleviate patient discomfort. The formation of thrombi further exacerbates patients' fear of movement. Thrombi not only increase the risk of activity limitations but also may lead to more serious complications, affecting patient prognosis. In this study, two patients stopped moving their arms after tube placement due to thrombosis, which is consistent with the negative impact of thrombi on patient mobility mentioned by Zhenzhen Li et al.¹³. Therefore, for the prevention of thrombosis, a stepwise functional exercise program needs to be developed in clinical care: 24 h after tube placement, patients are encouraged to perform moderate joint activities, such as clenching the fist, rotating the wrist, and flexing the elbow to promote blood circulation and reduce the risk of thrombosis. The importance of functional exercise is emphasized in daily maintenance, urging fist-clenching exercise, etc. Therefore, the catheter maintenance process is the best time for nurses to provide personalized care for patients. Postactivity cardiac discomfort is a newly observed kinesiophobia trigger in this study, the mechanism of which may be related to the specific location of the catheter, with the tip at the junction of the superior vena cava and the right atrium. For such patients, in addition to routine imaging or ultrasound review for localization, patients are instructed to record specific discomfort-inducing movements, such as combing the hair and turning around, and to circumvent the discomfort stimulus by designing alternative movement patterns, such as restricting the shoulder abduction angle to $\leq 90^\circ$, to ensure the ability to perform daily life tasks.

Psychological stress after tube placement is another important factor contributing to kinesiophobia behavior. Fear of first-time tube placement, inappropriate access to information, and psychological shock at the time of disease diagnosis can have a profound impact on a patient's psychological state. In this study, five patients expressed fear and nervousness at the time of first tube placement. Fear of first-time catheterization not only affects patients' daily activities but also may lead to a decrease in their confidence in catheter management. The study data further revealed that the three respondents who were not undergoing catheterization for the first time during their illnesses demonstrated a significant psychological adaptation advantage, as they experienced relatively less psychological stress after the catheterization operation and demonstrated greater confidence and adaptability to subsequent life with a catheter¹⁴. In addition, some patients reported that the excessive content of their initial education led to increased pressure and even fear of carrying out normal activities, and the lack of information also led to a decline in patients' confidence in catheter management, which in turn increased the occurrence of fearful behaviors. The degree of firmness and comfort of the dressing also had a significant effect on patients' kinesiophobia behavior. Patients are very sensitive to the details of catheter maintenance, such as the firmness of the dressing and the sterilization process, and are concerned that improper handling may lead to catheter dislodgement or infection. In this study, some patients reported that the insecure adhesion of the dressing affected their mobility. To address such phenomena, information should be provided in stages: ① Before catheter insertion: Explain the function and operational procedure of the catheter in plain language, supplemented by graphics and illustrations. ② After catheter insertion: Emphasize key points of daily care and elucidate the identification of emergency situations through case studies. ③ Before discharge: Provide a "Life

Checklist for Patients with a Catheter,” highlighting essential information that must be known¹⁵. We proactively ask patients and their families the 2–3 questions they are most worried about and provide targeted answers to avoid one-time information bombardment. Psychological shock at the time of disease diagnosis is also an important factor leading to kinesiophobia behavior. Patients often feel bewildered when faced with a confirmed diagnosis of a disease, and this psychological state may lead them to neglect catheter management or be overly nervous about the presence of the catheter. In this study, some patients reported that they neglected catheter management at the early stage of disease diagnosis due to low mood, which led to reduced activity. Therefore, nursing staff should grasp the dynamic changes in patients’ fearful psychology at each stage and period, assess the problems faced by patients in a timely manner, guide patients to actively express their true inner thoughts, master the skills of venting their bad emotions, and provide targeted psychological guidance according to the actual psychological situation of patients¹⁶.

In terms of engaging in kinesiophobia coping at home and at work, patients adapt to the presence of a catheter in a variety of ways and adjust their daily routines to cope with kinesiophobia behaviors. In this study, patients generally reported being very sensitive to the catheter arm in the early stages of catheterization and avoided touching or overactivity. Over time, patients gradually adapted to the presence of the catheter and adjusted their daily routines. Patients adjusted their sleeping position for fear of pressing on the catheter and even used aids to protect the catheter. Patients in the study reported that by adjusting their sleeping position and using auxiliary tools, they were able to better protect the catheter and reduce the occurrence of kinesiophobia behavior¹⁷. Some patients stated that during the catheter maintenance process, the patient and meticulous care as well as health education provided by the nursing staff, especially in cases involving elderly patients or situations where patients might easily become lax¹⁸, the continuous supervision and encouragement helped them better move the arm on the side with the catheter, thereby preventing the occurrence of kinesiophobia. Studies have shown that negative experiences of others increase their fear of movement, whereas positive guidance helps them cope better with catheter management. The relevant literature has also shown that the peer education model significantly increases self-efficacy¹⁹. Fatigue is associated with tumors or treatment and is considered one of the complications in most patients with tumors. A balance of rest and necessary exercise is needed during chemotherapy, which can be within the patient’s tolerance, encouraging 1–2 rounds (5–10 min each) of brief small movements of the arm on the side of the catheter (e.g., clenching and unclenching of the fist, rotation of the wrist), and in the case of fatigue or severe adverse effects of chemotherapy, family members assisting the patient in completing the passive movements of the joints (e.g., lifting of the arm, flexion of the elbow). The national and international literature also suggests that multimodal physical exercise and functional rehabilitation programs have beneficial effects on improving the autonomy of patients with cancer-related fatigue²⁰.

In summary, physiological discomfort after PICC placement, psychological stress, and kinesiophobia coping in home life and work are important factors affecting patients’ kinesiophobia behavior. Interventions targeting these factors can effectively reduce patients’ kinesiophobia behavior, decrease complications, and improve their quality of life. Future studies should further explore the effectiveness of these interventions and develop more targeted strategies to manage kinesiophobia behavior, develop new vascular access devices to make catheters more biocompatible, minimize patients’ somatosensory feedback, and thus improve the comfort and safety of long-term indwelling therapy.

Limitations

Despite the value of this study, it also has its limitations. First, this study only interviewed a certain tertiary hospital in the Ningbo area and did not involve patients with PICC catheterization in multiple areas and centers.

Data availability

The datasets generated and analysed during the current study are not publicly available due to privacy protection but are available from the corresponding author on reasonable request.

Received: 7 May 2025; Accepted: 24 October 2025

Published online: 25 November 2025

References

1. Bray, F. et al. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J. Clin.* **74** (3), 229–263 (2024).
2. Li, M., Yunjiang, L. & Yinhua, L. Clinical practice guidelines for central venous access in breast cancer in China (2022 edition). *Chin. J. Pract. Surg.* **42** (2), 151–158 (2022).
3. Shalu, X. et al. Qualitative study on the real experience of two central venous catheterization methods in elderly patients with colorectal cancer undergoing chemotherapy. *J. Nurses Train.* **37** (4), 378–383 (2022).
4. Sánchez Cánovas, M. et al. Thrombosis and infections associated with PICC in onco-hematological patients, what is their relevance? *Clin. Transl Oncol.* **26** (12), 3226–3235 (2024).
5. Liuyue, W. et al. Analysis of the status quo and influencing factors of kinesiophobia after PICC placement in hospitalized patients. *J. Nurs. Sci.* **30** (5), 23–27 (2023).
6. Liuyue, W. et al. Status and influencing factors of patients with kinesiophobia after insertion of peripherally inserted central catheter: A cross-sectional study[J]. *Med. (Baltim).* **101** (30), e29529 (2022).
7. Qiating, L. et al. Analysis of the status quo and influencing factors of kinesiophobia in cancer patients with PICC placement. *J. Nurs. Sci.* **38** (6), 59–62 (2023).
8. Duan, W. et al. Management of venous access Port to overcome kinesiophobia of patients with malignant tumors: A review. *Med. Sci. Monit.* **17**;30, e943181 (2024).
9. Dupuis, F., Cherif, A., Batcho, C., Massé-Alarie, H. & Roy, J. S. The Tampa scale of kinesiophobia: A systematic review of its psychometric properties in people with musculoskeletal pain. *Clin. J. Pain.* **39**(5) (1), 236–247 (2023).

10. Wang, S. M. et al. Qualitative exploration of home life experiences and care needs among elderly patients with temporary intestinal stomas. *World J. Gastroenterol.* **14** (22), 2893–2901 (2024).
11. Jinhua, L., Linhua, J. & Jianhong, X. Analysis of the status quo and influencing factors of kinesophobia in the catheterized limb of cancer patients with PICC placement. *Contemp. Nurse (Suppl.)* **31** (12), 137–141 (2024).
12. Jian, Z. et al. Research progress on nursing care to reduce continuous oozing of blood after PICC placement in patients with thrombocytopenia. *Shanghai Nurs.* **23** (7), 66–69 (2023).
13. Zhenzhen, L. et al. Consultation and treatment experience of catheter-related thrombosis in cancer patients. *Chin. J. Gen. Surg.* **31** (6), 806–812 (2022).
14. Jie, S. et al. Meta-integration of qualitative studies on fear psychology in patients with PICC placement. *J. Nurs. Sci.* **37** (17), 80–82 (2022).
15. Liuyue, W. et al. Status and influencing factors of patients with kinesophobia after insertion of peripherally inserted central catheter: A cross-sectional study. *Med. (Baltim.)* **29;101** (30), e29529 (2022).
16. Yuanlu, Z., Ruijuan, D. & Chang, Y. Effects of hierarchical psychological nursing based on the hierarchy of needs theory on lung cancer patients undergoing radiotherapy. *Med. Clin. Res. [J Adv. Online]* ; (1):131–134 (2025). [2025-03-03].
17. Sentandreu-Mañó, T. et al. Kinesophobia and associated variables in patients with heart failure. *Eur. J. Cardiovasc. Nurs.* **23**(3) (12), 221–229 (2024).
18. Alpalhão, V., Cordeiro, N. & Pezarat-Correia, P. Kinesophobia and fear avoidance in older adults: A scoping review on the state of research activity. *J. Aging Phys. Act.* **18** (6), 1075–1084 (2022).
19. Yang, H., Yiwen, S. & Liyuan, Q. The impact of peer education on self-efficacy and quality of life in lymphoma patients. *Chin. J. Oncol.* **44** (7), 725–731 (2024).
20. Hu, Y. et al. Effect of exercise for patients with advanced lung cancer and cancer-related fatigue: A systematic review and meta-analysis. *J. Sport Health Sci.* **14**, 101017 (2024).

Author contributions

Liangyan Zhang¹, Chen Zhang², Yanfen Yu³, Kesang Li¹ & Hanbing Yan¹.

Funding

Medical Scientific Research Foundation of Zhejiang Province (2023KY1091). Medical Scientific Research Founding of Zhejiang Province (2025KY1397). Key Discipline of Ningbo No.2 Hospital (2023-Y08).

Declarations

Competing interests

The authors declare no competing interests.

Additional information

Correspondence and requests for materials should be addressed to C.Z.

Reprints and permissions information is available at www.nature.com/reprints.

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Open Access This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

© The Author(s) 2025