Research

Dealing with Central Vascular Access Devices: A Qualitative Study on Cancer Patients' Experiences

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Abstract

Introduction. Central vascular access devices are widely used in oncology settings due to the significant side effects of chemotherapy on blood vessels. Despite the methodological robustness of the literature, the enhanced integration of patients' perspectives would enrich the evidence on this topic. This study explores oncology patients' experiences with cVADs (PICC and TIVAD), from insertion to daily life management.

Methods. We conducted a generic qualitative interview study with thematic analysis. Adult patients with a Peripherally Inserted Central Catheter or a Totally Implantable Venous Access Device receiving oncological treatment at the Oncology Department of the Azienda USL – IRCCS of Reggio Emilia were included, as also those who completed the treatment plan.

Results. The emerging themes were categorized into three main areas: (1) catheter implantation, (2) catheter maintenance, and (3) "daily life" with the catheter. Patients reported a high degree of satisfaction with the information and the education received by healthcare professionals: this appeared crucial in reducing anxiety and fear during the device placement and its daily management. However, patient engagement in the device selection appeared less consistent. The devices were well tolerated and had a low impact on their daily activities. All participants perceived the devices as helpful and safe during their care pathway.

Discussion. The study confirmed the importance of central venous access devices to minimize patient discomfort during chemotherapy treatment. The competence and empathy of healthcare professionals, along with adequate information and education, contribute to reducing patient's anxiety. Improving patients' engagement in the device choice is necessary. Patients reported a positive experience, enabling them to cope with the device, even at home.

Keywords: Qualitative Research, Oncology, Vascular Access Devices, PICC Line Catheterization, Port-A-Cath

Introduction

In oncology settings, central Vascular Access Devices (cVADs) are widely used due to the toxicities on blood vessels of cancer treatment. Depending on treatments, patients could live with these devices for a long time. CVADs can be inserted centrally into the subclavian or jugular vein, with or without tunneling, or implanted through a subcutaneous port. Alternatively, they can be inserted into one of the peripheral veins of the upper extremities.[1] Peripherally Inserted Central Catheters (PICCs) and Totally Implantable Venous Access Devices (TIVADs) are safe and valid options but have specific advantages and disadvantages: PICCs offer the advantage of being easy to insert and less invasive, but they require frequent monitoring and are more prone to infections.[2] On the other hand, TIVADs are ideal for long-term treatments, reducing the risk of infections and requiring less maintenance, but they involve a surgical procedure for implantation, making them more invasive. Both require specific expertise for proper management. Healthcare professionals must possess solid skills to guide patients toward the most suitable choice through shared decision-making.[2] Patients should learn to manage cVADs and adapt their habits accordingly.[3] Increasing attention has been given to the involvement of patients and their families in clinical decisions, highlighting the importance of this collaborative approach.[4-11]

Research on cVADs has primarily focused on their appropriateness, positioning, and management,[4-11] but fewer studies have addressed patient experience and satisfaction. A recent qualitative study found that patients generally accepted the cVAD as part of their treatment, particularly those who had previously undergone chemotherapy through peripheral veins, finding it more convenient and less painful. TIVADs were described as more manageable and safer than other cVADs, with minimal impact on quality of life.[12] Ritchie et al.[4] also emphasized that TIVADs better preserve daily life priorities, such as freedom of movement and body image integrity, than other devices.

However, the discomfort and complications associated with TIVAD insertion and management are often underestimated by patients, who rely on professional guidance to handle these issues.[4] In contrast, PICCs may impact privacy and body image more, with many oncology patients advised to conceal the device during social interactions.[13-15] Moreover, PICC management requires adherence to aseptic techniques.[13-15] Patient education and involvement are crucial in improving skills, compliance, satisfaction, and perceived safety.[13,15,16] Therefore, nursing competence in cVAD management and training is essential.[15] Despite the methodological robustness of the literature,[17] the enhanced integration of patients' perspectives would enrich the evidence on this topic.[10] This study explores oncology patients' experiences with cVADs (PICC and TIVAD), from insertion to daily life management.

Methods

Study design

We conducted a generic qualitative interview study with thematic analysis, a flexible, open-ended approach to explore people's experiences and perceptions. It doesn't follow a strict theoretical model but aims to gain a practical and in-depth understanding of participants' perspectives, especially in healthcare settings.[18,19] To define the problem of interest precisely and to orient the interviews, an overview of the recently available evidence on the topic was performed.

The research question arises from the existing literature, which highlights gaps and areas not fully explored regarding patient experiences with vascular access in oncology settings, thus justifying the need for further investigation into these aspects. All participants had detailed instructions and information about the study procedures; informed consent to the study attendance and data utilization was collected before all procedures. The study followed the COREQ (Consolidated Criteria for Reporting Qualitative Research) guidelines.[20]

Fidelity

Methodological rigor and fidelity to the data were pursued through various strategies. Audio recording of the interviews, verbatim transcription by an author (MG), and independent analysis ensured data accuracy and contributed to the credibility of the research material. A postdoctoral researcher (MG) with significant experience in qualitative research supervised the work during the interviews and analyses. Two researchers (GM, MF) conducted the interviews and performed the analyses; neither had worked directly with any participants before the interviews. The interviewers had at least a master's degree in research methodology and received specific training on the study method and how to approach oncology patients before the study started. The participants received complete information on methods; the interviewers disclosed their backgrounds and interests to the participants before starting each interview. In addition, the interviewers reflected on their experiences and biases about the research topic throughout the study. The interview was developed for this study; its structure is reported in Supplementary File 1.

Setting and participant selection

In-patients and out-patients who underwent PICC or TIVAD positioning at the Oncology Department of the Azienda USL – IRCCS of Reggio Emilia were recruited. All patients were adults enrolled in the early follow-up phase after completing their chemotherapy plan in stable conditions. All of them received detailed information and health education on cVAD management before the implant. The study participants were recruited adopting a convenience method. Eligible patients were identified by consulting the Oncology Department's clinical documentation and selecting those who experienced PICC or TIVAD positioning. The type of cancer, disease stage, and treatment plan were not considered for patient selection. The sample size was adapted during the research process based on data saturation.

Data collection

Patients were approached through semi-structured face-to-face interviews, during which they were free to share their thoughts and experiences, with the interviewer playing only a guiding role. Data were collected through these interviews and recorded with the participant's consent. The recordings were then transcribed verbatim to ensure accuracy. All personal information was handled confidentially and in compliance with privacy regulations, and the data were anonymized to protect participants' identities. Sociodemographic data of participants were collected. The interview scheme was structured based on the results of the available literature in the oncology field.[12,21] The interview guide (Supplementary File 1) focused on themes related to vascular access management, such as patients' experiences with different types of devices, the daily challenges in the care and maintenance of the access points, and the potential psychological impact.

The questions also explored patients' perceptions regarding the duration of treatment, difficulties in communication with healthcare professionals, and coping strategies for adapting to the use of vascular access devices during their treatment journey. Each interview was planned to be 20-30 minutes long and performed when the patient had a hospital visit. The presence of the family caregiver was allowed whether the patient desired it. A dedicated room was used for the interviews to create a comfortable environment, and the appointments were scheduled in advance. The interviewer supported the patient's storytelling by adopting an active listening technique, and field notes were collected to record non-verbal behaviors. All the interviews were recorded and transcribed verbatim. The patient's availability for any subsequent interview to clarify unclear concepts was obtained. To protect the participant's privacy, the recording files were deleted after the fidelity evaluation of their verbatim transcription and before the analysis.

Data analysis

Sociodemographic data of participants were analysed through frequencies and percentages. A thematic analysis identified key concepts, themes, and sub-themes relevant to the research objectives.[22,23] Two independent researchers read the transcripts multiple times to identify emerging themes and to extract and categorize concepts and content. The data were tabulated and manually analyzed. Consistency between the main themes, content categories, and transcript data was assessed through an iterative process. Researchers combined an inductive and deductive approach during the analysis, identifying meaningful statements representing themes and categories. The analysts met regularly to group the identified labels and define sub-themes and overarching themes.[24] To ensure methodological rigor, researcher triangulation was adopted by comparing the results obtained by multiple analysts to enhance data credibility.[25] Additionally, bracketing was applied, meaning that researchers set aside their own biases and expectations to minimize the influence of personal experiences on data interpretation.[26] Finally, the analyses were compared among the researchers, and any discrepancies were discussed until consensus was reached. A third researcher supervised the entire process, intervening in case of conflicts to ensure the reliability of the analysis.

Ethical considerations

The article discusses the ethical problems encountered during qualitative research, emphasizing the importance of ethical principles throughout the research process. The authors reflect on the complexities of adhering to these principles, illustrating the challenges and decisions made during the study.[27] The study protocol was approved by the Area Vasta Emilia Nord ethic committee (n°.124594/28.10.2019).

Rigour and reflexivity

As the fidelity paragraph shows, rigour is essential to ensure the credibility, dependability, and transferability of findings that inform patient care and clinical practice. Guidelines have been followed.[20] Reflexivity was considered, by engaging in ongoing researchers' self-reflection, acknowledging their influence on data collection and interpretation.[26]

Results

Sample characteristics

Twenty patients were interviewed between April and August 2020; almost all provided a one-shot interview, and only one participant required a follow-up clarification. The whole group (females N = 16; males N = 4) had an average age of 70 years (range: 39-82 years). Cancer types were breast (N = 5), bowel (N = 4), lung (N = 3), prostate (N = 3), head and neck (N = 2), bone (N = 1), and gastric (N = 2).

Theme: catheter implantation

A choice not always shared

The participants reported what they experienced with catheter choosing. The majority have been involved in the decision process, except for a small portion of them who received information on positioning but had not participated in the choice. Patients recognized the expertise in proposing the best caring strategy, leading some to trust the clinical decision.

> *"They just told me that the PICC line was more suitable for my therapy." [Pt. 4].*
> *"The doctor decided, he told me that the port was more convenient and gave me the appointment." [Pt. 10].*

Effective information, always

All patients reported to have had a full explanation of the VAD placement procedure from both the positioning team and the oncology team. The information was considered exhaustive and comprehensive by all participants.

> *"The procedure was explained to me by the vascular access team... They were very skilled. [Pt. 5]"*

All was ok, no pain

Despite the differences between PICC and TIVAD placing techniques, the emotional pathways reported by the participants were similar. Several of them reported fear and agitation before the placement. However, the provided information and the anesthesia were favorable factors that helped them to deal with their symptoms, perceiving an overall good experience.

> *"When I was in the room, I was quite worried; but the nurse who placed the catheter was very kind and professional. I have to tell, I* did not

> *feel any pain during the intervention, so I calmed down... I felt a sort of protection. [Pt. 8]"*

A special attention to care

The humanity and listening skills of the healthcare professionals on the vascular access team are claimed to be appreciated by patients, helping patients to have a better experience.

"When I went there [vascular access ambulatory, Ed.], I was really worried. The nurses took time to reassure me. They reassured me a lot. [Pt. 6]"

> *"During the catheter placement, I felt good. The nurses made a good work, it was a very intimate moment, and they took particular attention to care. It was painless. [Pt. 15]"*

Theme: catheter maintenance

Detailed instructions and a bit of luck

Patients considered the information on catheter maintenance and management clear and comprehensive. All patients demonstrated competence in the management of their catheter during the interviews. Some interviewees appreciated the vascular access team's attention in reducing the device-related discomfort.

> *"The PICC maintenance includes disinfection and dressing change once a week, and flushing. [Pt. 17]"*
>
> *"I was informed it needed to be managed every week, and nurses would have taken blood samples and changed the dressing (PICC) when I would be there for a visit. [Pt. 4]"*
>
> *"I must flush the Port [TIVAD, Ed.] every two months when it is not used. [Pt. 18]"*

Additionally, some other factors emerged clearly during the catheter maintenance activities: relational and professional items such as the patient's preference for such professionals instead of others, the recognition of nurses' expertise, and the cVAD utility.

> *"I have a personal relationship with the nurses. During my unlucky journey, I met very competent professionals; however, since I removed the PICC when I needed blood tests, I hope to find someone with a gentle touch. [Pt. 1]"*
>
> *"I was lucky to meet a ward nurse who showed great competencies, a welcoming attitude, and attention to avoid the pain. So, for my dressing change, I tried to choose her at each access [Pt. 8]"*

Almost all patients knew the procedures to manage the cVAD at home. During the interviews, patients with a PICC discussed the need to keep it dried during body hygiene using a special waterproof sleeve to protect the emerging site. In contrast, patients with a TIVAD highlighted the need to avoid bumps. Only one patient was not informed about the management of the device.

> *"They explained to me how to use the "Limbo" [a special protective sleeve for the PICC line, Ed.] for showering. [Pt. 4]"*
>
> *"My wife is afraid of hurting the port [TIVAD, Ed.] during intimacy, so she is very careful. [Pt. 2]"*
>
> *"No healthcare education was provided to me regarding the maintenance of the port [TIVAD, Ed.], and I didn't ask anything. Maybe, I will inquire about it once my journey will be finished. [Pt. 10]"*

No serious complications, but the adhesive dressing is unbearable

Many patients did not develop catheter-related complications. One experienced a deep vein thrombosis that resolved quickly with anticoagulant therapy. Ten out of 14 participants with PICC have had adhesive dressing-related skin toxicity, including itching and blisters development. In all cases, the problem was resolved by changing the dressing. Nursing monitoring of skin toxicities was essential to detect the problem early.

> *"I suffered a lot because of the adhesive dressing; I changed it three times, the first one caused blisters. [Pt. 4]"*
>
> *"I had only one complication, skin blisters caused by the dressing. Fortunately, the nurses were very skilled and found the right adhesive. [Pt. 16]"*

Two patients mentioned discomfort around the TIVAD port area caused by the car seatbelts; this sub-cohort reported no further issues.

> *"Since I have the port [TIVAD, Ed.], I have to pay attention to my movements, and the seatbelt bothers me. [Pt. 2]"*

Theme: "daily life" with the catheter

A necessary evil

Half of the cohort reported minimal impact of the catheter on daily life; some said they forgot they had it. Its presence conditioned daily activities at some specific moments, such as body hygiene and during some household tasks.

> *"For example, when making the bed, I felt a tug on my arm when I pulled up the sheets; then,*

> *I remembered it and tried to make this thing slower. [Pt. 6]"*
>
> *"I remembered it when I lifted heavy things, like groceries, or used the garden shear. It was bothersome. [Pt. 7]"*

Two patients referred catheter-related continuous awareness, emphasizing that it was a visible medical device. Some individuals associated its presence with a constant reminder of their illness.

> *"During the treatment phase, I could see it on my arm every time; it was a tangible item of my problem. It was like a part of the treatment cycle. [Pt. 8]"*

<u>A nearly normal life</u>

Half of the patients reported they did not have to modify daily habits, excluding some precautions necessary for safety (e.g., maintaining a dried dressing or avoiding bumps). However, some patients adapted their daily routine to the catheter maintenance schedule and family needs.

A sense of protection towards the medical device to prevent accidental complications has been observed. Participants who were mothers reported distress towards their children due to fear of pain or complications from mother-child interactions such as hugging or playing. The mothers tried to contain fear-related expressions when interacting with their children to protect them from what they were going through.

> *"I changed my way of doing some things. For example, I am very careful to avoid catheter bumps when carrying groceries or holding my nephew because children are unpredictable. [Pt. 2]"*
>
> *"My son hugged me; he hurt me squeezing my arm; it was a bother thing. Moreover, I had a dressing-related skin reaction during the treatment period; when my son saw it, he was very scared, so I tried to hide it. We should consider how to explain these problems to children. [Pt. 7]"*

In most cases, the medical device did not pose any aesthetic problems. Some patients covered it with PICC covers that matched their clothing or wore loose shirts to avoid it being visible. Only two patients with the port mentioned having problems because the wound was visible.

> *"It bothers me a bit because the wound is visible, but I get over it; I pretend it is nothing. My wife is afraid of hurting me during intimacy, so she is careful. [Pt. 2]"*

Although the participants denied important aesthetic issues, the devices seemed to affect their body image, and their loved ones perceived that. The medical device was evident and tangible, exposing patients to judgments, preventing them from discreetly living with their illness, and making it "uncomfortable" for family and social stakeholders. Many patients covered it up to avoid families' upsetting and social stress.

> *"... it is a visible element and clearly draws the attention of those who do not know it, so certainly it can be a problem for those who want to live the illness with privacy. [Pt. 8]"*

<u>Small aids</u>

Half of the participants did not need help managing the catheter, while the other half needed help only covering their arm for the shower.

> *"When I took a shower, my husband would lend me a hand because I could not cover it on my own. [Pt. 5]"*

Finally, participants were asked, "Do you want to share anything about your experience?" PICC and TIVAD patients underlined the device's benefits in reducing blood vessel damage and improving safety.

Discussion

This study informs the scientific community about patients' perspectives on cVADs, which are essential in targeting resources, education needs, and clinical decisions. cVADs are commonly used to ensure adequate venous access during anticancer treatment. They consent to reduce the risk of severe side effects due to the drug toxicity on peripheral veins and to prevent drug extravasation and tissue damage.[28] However, the cVAD positioning can cause complications such as infections, deep vein thrombosis, pain, and discomfort, and its management needs can affect a patient's life activities leading to coping issues.[9] Our study provided valuable insights describing oncology patients' experience living with cVADs: we underline the essential role of nurses in supporting the device's choice and daily life management. A qualitative approach was adopted as we agreed that this method was still under-explored in this setting, enhancing precious patient points of view.

It was evident that although participants perceived this medical procedure as a "necessary evil" in the context of the anticancer treatments, the presence of a cVAD conditioned their daily activities, and they constantly remembered their illness. The results showed that healthcare professionals had a good attitude in informing and educating patients about these medical devices' placement and daily maintenance. Nevertheless, structured patient education programs promoting coping might be helpful: patients will demonstrate safer behaviors and stable adherence to the recommendations. In this scenario, the availability of new knowledge on patients' psycho-adaptive abilities and the health professionals' educational role becomes fundamental. However, only some studies explored the patients' experience in this setting; existing literature seems elusive in reporting the educational skills of healthcare professionals, particularly those working outside the oncology department or in community settings.[12,15] As revealed by our findings, some patients tended to play passive roles during healthcare decision-making processes in line with what was reported by literature: they preferred to rely on clinicians' decisions.[29,30] Despite their knowledge of available options, they decided not to contribute to the choice. However, our findings highlighted professionals' scarce attitude toward involving patients in the process, especially regarding the device's choice. These findings consistently support the need to improve information effectiveness and timing to amend the overall quality of our informed consent processes. Not only clinical factors can influence decisions, such as the device's choice. Professionals should be comfortable with patients' perspectives and preferences, as patient engagement should be integral to caring.[31]

Although it did not emerge as a central theme from the interviews, all patients expressed a sense of vulnerability due to anxiety about cVAD positioning as an invasive procedure and concerns about their clinical condition. The importance of a personalized approach to the patient's needs and the attention to the relationship becomes evident, as referred by interviewees. It would be necessary to adopt strategies to enhance patients' needs, understanding, fears, and adaptive methods, enhancing awareness and perceived safety. Patients' concerns were frequently addressed through active listening, facilitated by a stable therapeutic relationship, particularly with nurses. These factors influence the quality of nursing care, leading to higher patient satisfaction. This study provided important information that will be useful to correct behaviors and organization plans to ensure greater patient engagement in caring and emphasize the importance of a patient-centered approach.

Strength and limitation

This qualitative study allowed the authors to deeply understand patients' experiences and perceptions regarding vascular access, providing a patient-centered perspective and revealing unexpected aspects of care. However, the authors may not encompass all potential interpretations of the data when analyzing the themes. Moreover, results refer to the Italian context. While the study is valuable for developing patient-centered interventions, the authors suggest integrating it with quantitative approaches to address clinical issues more precisely and comprehensively.

Implication for nursing practice, research and organizations

Nurses should adopt a patient-centered approach, addressing not only the technical aspects of vascular access but also patients' emotional and psychological needs. Clear communication, education, and personalized care plans are essential to improving patients' daily lives and treatment adherence.

Future studies should explore the long-term effects of vascular access on quality of life and compare different types of access. It is important to develop interventions to reduce complications and improve patient comfort, integrating both qualitative and quantitative methods for a comprehensive understanding. Healthcare organizations should invest in continuous staff training and promote patient-centered protocols to improve vascular access management. Supporting research on innovative technologies and fostering collaboration among professionals are crucial for optimizing patient outcomes.

Conclusion

The study increased knowledge of the perception and experience of patients undergoing stressful medical procedures such as cVAD positioning and management. It confirms the importance of cVADs during anticancer treatment, as it reduces discomfort and complications. Furthermore, it highlighted the need for a more inclusive and personalized approach to patients: the nurses have a crucial role in the device’s choice, activating coping strategies and promoting effective home management. This may facilitate patients' assuming of greater awareness of their oncology pathway and make them feel safer.

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