

# Living with a peripherally inserted central catheter: the perspective of cancer outpatients—a qualitative study

Paula Parás-Bravo<sup>1</sup>  · María Paz-Zulueta<sup>1</sup> · Miguel Santibañez<sup>1</sup> · Cesar Fernández-de-las-Peñas<sup>2</sup> · Manuel Herrero-Montes<sup>3</sup> · Vanesa Caso-Álvarez<sup>3</sup> · Domingo Palacios-Ceña<sup>2</sup>

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## Abstract

**Purpose** The aim of this study was to describe the experience of using a peripherally inserted central catheter (PICC) in cancer sufferers receiving outpatient treatment.

**Methods** A qualitative, phenomenological study was performed. Purposeful sampling methods were used. Data collection methods included semi-structured interviews and researcher field notes. Thematic analysis was used to analyze data. The study was conducted following the Consolidated Criteria for Reporting Qualitative Research guidelines.

**Results** Eighteen patients (61% women, mean age 58 years) participated. They spent a mean duration of 155 days with the line in place. Two themes were identified with different subgroups. The theme “Living with a PICC line,” including the subthemes “Benefits” and “Disadvantages,” displays how the implantation is experienced by patients in a dichotomous manner. This highlighted both the beneficial and negative aspects of the implantation. The second theme was “Adapting to life with the catheter” and comprised three subthemes: “Advantages,” “Lifestyle modifications,” and “Overall assessment of the peripherally inserted central catheter,” which shows how patients gradually accept the catheter by adapting their lifestyle.

**Conclusions** Over time, most patients considered having a PICC line to be a positive experience that they would recommend to other patients, as they found that it did not alter their quality of life. These results can be applied in Oncology Units for developing specific protocols for patients.

**Keywords** Catheters · Central venous catheters · Medical oncology · Patients · Qualitative research

## Introduction

The National Cancer Institute defines cancer as “a collection of related diseases where some of the body’s cells begin to divide without stopping and spread into surrounding tissues” [1] and is considered to be one of the greatest public health problems in the world [2]. According to the International Agency for Research on Cancer, in the year 2012, there were 14.1 million new cancer cases and 8.2 million deaths directly related to cancer [3]. Cancer treatments include surgery with chemotherapy and/or radiation therapy, immunotherapy, targeted therapy, or hormone therapy, but chemotherapy is the most common [1–3].

Chemotherapy comprises drug treatments with different effects according to the type of agent, the route of administration, and the associated prescription [4]. The use of chemotherapy has enabled the possibility of controlling tumor growth and therefore increasing survival in the cases of chemotherapy-sensitive tumors, such as breast [5] and lung [6] cancers. Much chemotherapy is delivered by repeated intravenous administration, as are other adjuvant medications and oncologic treatments, and patients also require frequent blood draws to monitor and assess treatment response and effects [7]. Side effects of repeated intravenous access can include irritation, inflammation, and damage to the vascular endothelium. In

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✉ Paula Parás-Bravo  
paula.paras@unican.es

<sup>1</sup> Department of Nursing, University of Cantabria, Santander, Spain

<sup>2</sup> Department of Physical Therapy, Occupational Therapy, Rehabilitation and Physical Medicine, Rey Juan Carlos University of Madrid, Madrid, Spain

<sup>3</sup> Cantabria Health Service, Cantabria, Spain

addition, local venous complications, such as phlebitis, and the vascular vesicant action are caused by the extravasation of the medication to the subcutaneous tissue [8, 9].

As an alternative to peripheral venipuncture, central vascular access can be used [7, 10]. Different types include a direct central venous access in the subclavian vein or the internal jugular vein [7] using the Seldinger technique (a guiding wire through a trocar) or the modified Seldinger (a catheter over the needle, followed by a wire through the catheter) [11]. There are other central accesses, but their insertion is performed using peripheral venous access, thus avoiding direct puncture of large blood vessels [7]. One such approach is the peripherally inserted central catheter (PICC) line. The PICC line is inserted into the veins of an upper extremity and threaded into the larger veins in the chest. This type of catheter has the advantage of a lack of needle sticks and may be conveniently placed at the bedside [7]. There are also other types of PICC in which the implantable catheter or port consists of a catheter attached to a reservoir that is implanted into a surgically created pocket on the chest wall or upper extremity. To access the reservoir, a needle is inserted through the skin to the septum of the port [7]. The use of PICC is generally advisable in the following cases: patients with cancer and who have limited peripheral venous access, patients receiving regimes requiring prolonged or continuous intravenous infusions of multiple chemotherapeutic or supportive care agents, patients requiring repeated blood draws or clinical monitoring, and patients who expect to receive a vesicant agent as part of their treatment regimen [7, 12–14]. It is indicated in the absence of peripheral venous access or when it is severely damaged due to treatment or multiple venipunctures [15]. Using a PICC, the risk of extravasation is markedly reduced, which is particularly relevant for the administration of vesicant or irritating cytostatics [16]. In addition, although PICC lines are not exempted from complications, these are small in magnitude [12].

From the patient's perspective [17–21], PICC lines may decrease pain and suffering during treatment, as they help to avoid repeated venipunctures, and thus reduce the fear of having to change the catheter because of its obstruction. For instance, even when the catheter is placed in the dominant extremity, patients tolerate the catheter as this improves the vascular access for treatment [20]. Conversely, the insertion of the same is associated with anxiety and uncertainty [17, 18, 20]. Despite all these factors, patients accept that a PICC has a marginal impact on their activities of daily living, enabling patients to be treated in their homes rather than at the hospital [19, 20]. Previous studies [17–22] have focused on the patients' experience during insertion, or on the impact of the device on patients with different diseases, but none exclusively oncological processes.

Further research is required to illuminate the impact of this specific treatment device (PICC) on patients' lives, through their perspectives [20, 21]. Effective

administration of treatment and avoidance of complications are not the only elements considered by patients when determining their acceptance of the PICC. Describing patients' perception of PICC could help professionals in their daily clinical practice, and in the treatment of patients. Currently, few studies have investigated patients' experience of living with a PICC [19–21]. In addition, to our knowledge, no qualitative study exists exploring the experience of PICC insertion and living with a PICC, exclusively, among oncology outpatients. The aim of this study was to describe the experience of the use of a PICC line among cancer outpatients.

## Material and methods

### Design

This study was conducted following the Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines [23].

A qualitative phenomenological study was conducted [24]. These studies are typically used to obtain in-depth understandings of people's perceptions and behavior under specific circumstances, such as disease [25]. The primary characteristic of this scientific method is that researchers become closely involved in the processes of data acquisition and analysis. Data collection requires researchers to interact with participants in the study and within their social context. This allows some degree of mutual influence [24, 25]. Phenomenological research is a type of qualitative design that explores the peoples' experiences of being immersed in situations or phenomena (e.g., PICC). Phenomenology is based on experiences narrated in the first person (interviews and personal letters), in an attempt to understand the essence of a phenomenon [26, 27].

### Research team

Seven researchers were involved in this study (three women, four men). Three of the seven had experience in qualitative designs (DPC, CFP, PPB). Five hold PhDs in health sciences, are University professors, and were not involved in clinical activity (DPC, CFP, PPB, MPZ, MS). Two members of the research team worked as nurses in the study context (MHM, VCA) and had a previous relationship with the patients. The positioning of the researchers was established regarding the theoretical framework, their beliefs, prior experience, and personal motivations for participating in the research [28]. Research was based on an interpretivist theoretical framework. From this perspective, human action is meaningful and the goal of interpretive inquiry is understanding how people interpret the meaning of social phenomena [24].

## Context/setting

This study was conducted at the Hospital de Día Médico Oncológico y Hematológico (HDMO) of the Hospital Universitario Marqués de Valdecilla (Cantabria Health Service, Spain). At the HDMO, pharmacological treatments (chemotherapy and immunotherapy) are administered on an outpatient basis, as well as other intravenous treatments (blood transfusions, analgesics, or antibiotics). For safe and effective treatment, the PICC is inserted early on, to protect the vascular system from any type of damage or adverse effect associated with chemotherapy and its route of administration [7]. All patients who were included in the study were given PICC for the following reasons: (a) limited peripheral venous access, (b) requiring prolonged or continuous intravenous infusions of multiple chemotherapeutic or supportive care agents, and (c) requiring repeated blood draws. Most patients presented complicated and damaged venous accesses. The follow-up and care of the catheters was performed weekly by nurses specialized in oncology.

## Participants

The inclusion criteria consisted of the following: (1) older than 18 years and diagnosed with an oncological process, (2) with a PICC line inserted, (3) holding a chemotherapy prescription for venous administration, (4) attending the HDMO for outpatient oncological treatment, (5) able to communicate, and (6) who had signed the informed consent. All participants had to meet the previously defined inclusion criteria. All patients who were invited to participate joined the study, with no refusals.

## Sampling strategies

Phenomenological studies often use purposive sampling strategies [24]. Purposive sampling can be defined as the selection of potential participants based on specific purposes associated with addressing the research study question or aim [29]. Eighteen patients were included within the sample, none of whom withdrew from the study. The relevant patients for study participation were identified by the researchers who developed their clinical activity (MHM, VCA), such as nurses in the HDMO unit. The researchers made initial contact with the patients via the nurse in charge of the HDMO unit. The researchers explained the purpose and design of the study to the patients during an initial face-to-face contact session. A 1-week period was then granted for patients to decide whether they agreed to participate. During the second face-to-face session, they were asked to provide written informed consent and permission to tape the interviews if they agreed to participate. Following this, data were collected.

## Data collection

Data were acquired from May 2014 to November 2014, via researcher field notes and audio recording of the interviews. Individual, semi-structured interviews were conducted [24, 30] in a hospital room made available for this purpose (Table 1). The interview was limited to only the interviewer and the patient to ensure the patients' privacy. The interviews were always conducted by the same researcher (PPB).

During the interview, the researcher made notes, including a description of the environment, patients' non-verbal responses to questions, the use of metaphors in patients' narratives, and other relevant points that emerged in the interview [24]. In total, 18 in-depth interviews were performed (one interview for each patient). Participant recruitment finished when there was repetition in the information obtained from the interviews [24]. This was achieved at the time of the interview with participant no. 18.

## Data analysis

First, a complete and literal transcription of each interview and researchers' field notes was drafted. The texts were then collated for qualitative analysis [24], after which thematic analysis of the data was conducted [31, 32]. This process began by pinpointing the most descriptive content to obtain meaningful units. This was followed by a deeper analysis to reduce and identify the most common meaningful groups [31, 32]. Thus, groups of meaningful units were formed based on similar points or content. These units facilitated emergence of topics describing the patients' experience. This process of thematic analysis was conducted separately for each interview. Coding and analysis were conducted separately for each interview by three researchers (DPC, PBB, MPS), led by DPC. Later, the results of the analysis were combined during team meetings, in which the researchers met to discuss the data collection and analysis procedures [31, 32]. In case of differences, the final themes were identified by consensus.

The interviews were performed in Spanish. Collecting qualitative data in one language (Spanish) and presenting the findings in another (English) involves researchers making translation-related decisions that have a direct impact on the trustworthiness of the research and its representation [33]. For this reason, the following stages of translation were used: (1) verbatim transcription of the contents of the interview in Spanish followed by content analysis; (2) after the concepts and categories emerged from the data, two bilingual translators were used to translate the concepts and categories into English. The final English version was completed by agreement between both translators. (3) Next, bilingual staff took the English version and back translated the concepts and categories from English to Spanish to evaluate the equivalence between the source and target versions [34].

**Table 1** Semi-structured question guide

Research topics	Questions asked
Experience with catheter	How is your experience of having a catheter?
Insertion of catheter	How was your experience with insertion?
Activities of daily living	How is your daily life having a catheter? What is the most relevant to you?
Work activity	How does having a catheter of this type influence your daily work?
Family and couple activity	How does a catheter influence your partner and/or family life?
Strategies	Does it influence you when doing any activity? Which? How do you solve it?
Meaning of catheter	How is your experience of having a catheter? What is the most important thing to carry a catheter? What barriers and facilitators exist for you?

## Rigor

The COREQ guidelines [23] were followed. Furthermore, we used criteria by Guba and Lincoln (Table 2) for establishing trustworthiness of the data by reviewing issues concerning data credibility, transferability, dependability, and confirmability [28, 35, 36].

## Ethical considerations

The study was approved by the Cantabria Clinical Research Ethics Committee (internal code 2014.033) and performed in accordance with the Declaration of Helsinki [37]. Informed consent was obtained from all participants included in the study. Data were treated anonymously and confidentially according to the Spanish Personal Data Protection Act [38] and the Biomedical Research Act [39].

## Results

Eleven women and seven men, mean age 58 years (SD ± 11.72), participated. The mean number of days with the PICC line in place was 155.61 (SD ± 124.39) days. Table 3 shows clinical features of the sample.

Two main themes were identified based on the findings: (1) Living with a PICC line, formed by two sub-themes: “Benefits” and “Disadvantages,” and (2) Adapting to life with the catheter, formed by three sub-themes: “Advantages,” “Lifestyle modifications,” and “Overall assessment of the PICC” (Table 4).

**Table 2** Trustworthiness criteria

Criteria	Techniques performed and application procedures
Credibility	Investigator triangulation: each interview was analyzed by three researchers. Thereafter, team meetings were performed in which the analyses were compared and categories were identified. Participant triangulation: the study included participants belonging to different diagnosis. Thus, multiple perspectives were obtained with a common link (the experience of having PICC). Triangulation of methods of data collection: semi-structured interviews were conducted and researcher field notes were kept. Participant validation: this consisted of asking the participants to confirm the data obtained at the stages of data collection and analysis.
Transferability	In-depth descriptions of the study performed, providing details of the characteristics of researchers, participants, contexts, sampling strategies, and the data collection and analysis procedures.
Dependability	Audit by an external researcher: an external researcher assessed the study research protocol, focusing on aspects concerning the methods applied and study design.
Confirmability	Investigator triangulation, participant triangulation, and data collection triangulation. Researcher reflexivity was encouraged via the performance of reflexive reports and by describing the rationale behind the study.

*Credibility* confidence in the truth of the findings; *transferability* reporting that the findings have applicability in other contexts; *dependability* reporting that the findings are consistent and could be repeated; *confirmability* the degree to which findings are determined by the respondents and not by the biases, motivations, and interests of researchers [24, 28, 32]

We included some of the patients’ narratives taken directly from the interviews regarding the two emerging themes [24, 27].

## Living with a PICC line

Patients offered precise descriptions of the implantation process. They first spoke of their fear regarding the procedure and possible complications, clearly identifying both benefits and detrimental aspects. The implantation of the catheter in a surgical theater caused anxiety among patients who, despite the information provided, were fearful that the procedure was more complex than it seemed. “I worry to see the operating room and all dressed in green” (Pat 2). Nonetheless, after the implantation, most patients (Pat 1–6, 8–16, 18) acknowledged that it was a fast procedure that was hardly painful, “I hardly experienced anything” (Pat 4). “Wonderful placement, in a blink. It didn’t even hurt, just some discomfort, but nothing more.” (Pat 6). “I was afraid for what I had heard

**Table 3** Characteristics of the study participants

	Total <i>n</i> = 18	%
Age (years)		
Mean [SD]	58.11 [11.35]	
Gender		
Male	7	38.89
Female	11	61.11
Different cancer types		
Bile duct	2	11.11
Breast	2	11.11
Colon	5	27.78
Hodgkin's lymphoma	2	11.11
Lung	2	11.11
Ovary	1	5.56
Pancreas	1	5.56
Rectal	2	11.11
Sigma	1	5.56
Time (days with catheter)		
Mean [SD]	155.61 [128.00]	
Cause catheter placement		
Chemotherapy in continuous perfusion 24 h	5	27.78
Limited peripheral venous access	12	66.67
Vesicant chemotherapy	1	5.56
Dominant arm		
No	12	66.67
Yes	6	33.33
Previous PICC		
No	14	77.78
Yes	4	22.22

from other patients" (Pat 4). "In the treatment room, often speaking these catheters" (Pat 1).

Their experience of the negative aspects was more vivid and lengthy, characterized by the presence of pain, difficulties during the cannulation, extended time required for the insertion, and lack of information. It is worth noting that some, aware of how complicated their venous accesses were, acknowledged a feeling of empathy towards the professionals caring for them and, thus, underwent this process with a sense of normalcy, "I suffered more for the girls as they weren't able to find the vein" (Pat 1).

This situation was reported in four cases (Pat 1, 11–13) who had undergone a previous PICC and therefore were familiar with the procedure. This meant that they faced the subsequent implantation process free from anxiety and were able to place confidence in the professionals, "I wasn't scared, it was the second time and I was calmed" (Pat 1).

**Table 4** Themes, subthemes, and meaning units identified during analysis

Themes	Subthemes	Meaning units
Living with a PICC line	Benefits	Absence of symptoms Speed of procedure
	Disadvantages	Pain Difficulties during the cannulation Extended time required for the insertion Discomfort Empathy towards the professionals Lack of information
Adapting to life with the catheter	Lifestyle modifications	Personal hygiene Dress Sport PICC periodical care Esthetic aspects
	Advantages	Decrease of the number of punctures required Venous endothelial maintenance Impact on treatment
	Overall assessment of the peripherally inserted central catheter	Overall evaluation positive

### Adapting to life with the catheter

Within this theme, patients described living with the catheter and how this influenced their day-to-day life. Patients gradually adapted to the catheter, encouraged by the perceived positive aspects and advantages present in their daily life. 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, "Every day when I got up, I showered and 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" (Pat 1).

Some patients (Pat 2, 4, 9, 17) revealed that they felt uncomfortable when holding their children and while practicing sports. This unease was related not only to the physical presence of the device but also to the need of having to reflect on whether they could practice the activity or if it entailed a risk to the catheter—whether these activities were related to leisure, work, household, or childminding duties.

Six of the patients had the catheter inserted in their dominant upper extremity (Pat 2, 5, 9, 10, 15, 16). Although nurses initially avoided placing the catheter in the patients' dominant arm, this was not always possible. These patients reported

feeling apprehensive regarding performing daily life activities, as they feared that acting as usual might damage the catheter, “When I go shopping and I want to pick up bags I try to avoid the extremity with the catheter, but sometimes I realize [I am using it] and this worries me” (Pat 2). “As I have the catheter in the dominant arm I’m afraid it will break because I move it more” (Pat 9). “I try to move less that arm [dominant arm] though I know it’s not necessary” (Pat 16).

The patients did not consider having to go to the HDMO on a weekly basis to care for the catheter to be a disadvantage. Indeed, some patients preferred this and felt it was beneficial, understanding that ultimately, they were better cared for by receiving a weekly follow-up, “I must come every week to receive chemo, you cure me and check the catheter and so I leave feeling more at ease” (Pat 6).

Three patients (Pat 7, 10, 11) stated that the esthetic aspects of using the catheter were a disadvantage, as this entailed the use of a dressing and bandage covering the distal third of the forearm and the proximal third of the arm. Some female patients (Pat 6, 7, 16, 17) describe using other types of clothing or changing their dressing habits to conceal the catheter out of shame. One patient recounted how she sometimes did not feel very feminine or pretty with the catheter (Pat 16).

Regarding the greater advantages experienced by patients, these included the ease of access and the decrease of the number of punctures required, “They don’t have inject me repeatedly. That is the greatest advantage” (Pat 17).

A positive impact on treatment was also perceived as all patients received intravenous chemotherapy infusions. Five patients (Pat 4, 6, 8, 13, 18) received chemotherapy in continuous 24-h perfusions, via the catheter, and thus were able to receive outpatient treatment and continue with their daily life activities.

Regarding the overall evaluation of using a PICC line, the majority of patients affirmed that they would recommend it to other patients, as they felt the benefits, advantages, and positive impact on the oncological process to be greater than the inconveniences. Previous experiences of repeated punctures influenced the positive acceptance of PICC, “The assessment is very positive, as it doesn’t give me any problem and I have managed it to avoid everything that happened the last time... Just the thought of coming to the unit to receive chemo made me feel sick, not because of the medication, but because of all the previous injections, it was horrible” (Pat 6).

The younger patients reported a greater intensity of restrictions in activities of daily living.

## Discussion

This study reports the experience of cancer outpatients undergoing the insertion of a PICC line and their subsequent life with the catheter. Our results show how a patient’s experience

of catheter insertion is important for their eventual adaptation to and acceptance of the catheter. This experience is mainly characterized by certain benefits and a degree of discomfort during the insertion, followed by gradual modifications required in a patients’ daily life as well as advantages related to the use of the catheter and the final overall positive evaluation of PICC use.

### Living with a PICC line

The implantation of the catheter is related with the diagnosis and type of treatment prescribed [2, 4]. After diagnosis, patients undergo considerable emotional stress due to the substantial amount of information provided, fear of the unknown, and uncertainty of the prognosis [40–42]. Sometimes, and due to the need to start treatment as soon as possible, patients are forced to decide whether to have a PICC inserted without sufficient time to adapt and reflect on the potential positive and negative aspects [16, 17]. Previous studies [17, 18, 20] described that this hurried decision, combined with a lack of knowledge regarding the insertion process, causes patients to experience fear and apprehension, while anticipating a painful and distressing procedure [17, 19].

In our study, the implantation is perceived by the patients as a quick and virtually pain-free procedure, which coincides with previous reports [17, 18, 20], in which patients also considered implantation to be “short and enduring,” and the pain of which is considered to be moderate, and fast disappearing. Part of the success of the implantation is due to ultrasound-guided placement of the catheter, which helps the localization of the vessel [43]. Despite being in a controlled environment, paradoxically, in our study, the context of the operating theater where the insertion takes place led to feelings of anxiety and nervousness in some patients. This was controlled by the accompaniment of a nurse during the entire process. Previous studies show that this anxiety can decrease if a good level of communication exists between the nurse and the patient during implantation [17].

Previous studies [18, 20–22] have shown how part of the anxiety and fear suffered by patients during the insertion process is derived from a lack of information regarding the procedure. Those patients who have experienced a previous catheter implantation report a feeling of ease when confronted with the new implantation. Conversely, previous studies [18–21] described how patients are also apprehensive in relation to the possible limitations that the catheter may have on their daily life.

The authors of this study believe that much of the uncertainty or fear experienced by patients can be controlled and/or decreased if they are provided with clear and accurate information adapted to the capabilities of each patient, on behalf of the professional team [19, 20]. Thus, prior studies [21–23] describe how the information should not solely focus on

clinical and technical aspects, but must also describe aspects related with living with the catheter.

One important point we identify is that much of the information obtained by our patients comes from hearing the experience of other patients they encounter in different treatment rooms. This can cause patients to have a distorted image of the insertion process and living with the PICC, worsening their fear. Alternatively, encouraging comments may result in an easier adaptation, as they have received a positive and reassuring description of the procedure.

### Adapting to life with the catheter

One of the key aspects identified in our study was the positive impact that the PICC line has on the way patients experience their prescribed oncological treatment. Chemotherapy treatment can damage the venous endothelium and require frequent venipunctures and cannulations of peripheral catheters, which can cause patients to experience anxiety and fear [19, 21]. The main advantage of the PICC is the reduction in venipunctures, which improves the patient's quality of life [20]. Similarly, Song et al. [18] described how the most positive aspect regarding the use of the PICC was avoiding frequent venous punctures derived from analytical control and administering drugs.

Patients' daily lives are characterized by cautiousness, forcing them to limit aspects of their lives or activities that entail movements that might damage or deteriorate the PICC [19–23]. These restrictions to the daily life activities are experienced more intensely in young and adult patients who have a more active lifestyle (i.e., affecting studies, work). Sharp et al. [20] showed how, despite the fact that at first patients may reject the insertion of the PICC, thereafter patients report feeling greater freedom as they can receive treatment within their own home. This same study showed that the use of the dominant or non-dominant arm for PICC insertion had little impact on the patients' lives. In contrast, Johansson [21] reported how young patients with leukemia describe the negative impact PICC has on their daily life. Despite the fact that these patients reported and experienced limitations to hygiene, driving, sleeping, holding their children, physical activity, clothes, and even appearance, patients consider these to be acceptable considering the importance of the catheter and the success of treatment [19]. This positive overall perception of the PICC, despite the possible disadvantages, also appears in prior studies [17–20] and supports our findings.

Based on our results, we believe that communication during this process is essential [17, 44]. The patient should be informed before insertion of the reasons for the procedure, where and when the insertion will take place, what professionals will be present, what noticeable changes their bodies may undergo, and what care should be performed after insertion and/or at home. This communication should be

performed by an interdisciplinary team including physicians (diagnostic information, procedure), nurses (catheter care), and psychologists (management of emotions and catheter acceptance) [45]. It could incorporate a program of guided visits to know the place and the professionals who will attend them.

Esthetic aspects are also important. Similar to our study, Møller and Adamsen [46] focused on patients' clinical and psychosocial experiences with a central venous catheter, and reported that when prolonged use of the catheter is required, it produces psychosocial problems including altered body perception, sexual activity avoidance, and feeling stigmatized. Previous studies [47, 48] show how the peripheral central venous access in the forearm may be an alternative in women with breast or head and neck cancer, as it improves their satisfaction by decreasing the possibility of visible scarring. The esthetic aspect must be taken into account when informing the patient of the procedure of insertion, and of the repercussions that may have on physical image.

Another implication to consider is the training of professionals [43, 49]. Previous studies [49] show how combined theoretical and practical training in PICC placement allows for technical skill and yields high degrees of satisfaction. The integration of multidisciplinary training helps clarify all facets of PICC management, from insertion to care at discharge. Additionally, the application of multimodal strategies (practice, theory, real clinical cases) that improve staff education improve information exchange during care transitions, among different care areas [44].

Strengths of our study include the application of triangulation (by researchers to participants, methods, and collected data) and participant validation of the data obtained to ensure confidence in the truth of the findings. Additionally, including 18 participants with different diagnoses has allowed us to have a much broader perspective of the PICC experience. Limitations of our study include, first, current results cannot be extrapolated to all patients with a PICC, owing to the design used. However, these results may help professionals understand their patients using the PICC. Secondly, the interviews were performed in Spanish and presenting the findings in another (English) but we employed a rigorous translation method to address this. It is important to continue investigating patients' experiences of having a PICC to understand the impact the catheter has on patients' daily life and their daily therapeutic management [28]. These new investigations would help describe and explore other phenomena, such as the impact of medication administration routes on patients and adherence to treatment, the teaching and self-care process of patients with PICC, the process of adaptation of the patient with PICC at home after hospital discharge, and the perception of PICC in patients of different cultures or ethnic groups.

## Conclusions

Our main findings are regarding the positive and negative aspects of living with a PICC line. Among the benefits are the absence of symptoms, reduction of venous punctures, and rapid insertion. Conversely, negative aspects include the presence of pain, discomfort with the device, lack of information, impact on daily life, and need for adaptation to maintain quality of life. Over time, most patients considered having a PICC line to be a positive experience.

These results can be applied to Oncology Units to further improve understanding of the experience of having PICC and for developing specific protocols for preliminary patient visits to the unit where the insertion of the PICC will occur, an educational program about caring for device, and preparation for discharging patients with a PICC.

## Compliance with ethical standards

**Competing interests** The authors declare that they have no competing interests.

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