

Full title

The patient experience of a Peripherally Inserted Central Catheter (PICC): a qualitative descriptive study.

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Abstract:

Aim: To investigate the patient experience of PICC insertion, the significance of arm choice and the impact of the device on activities of daily living.

Background: Arm choice for PICC insertion is often determined by PICC nurses with little input from consumers. There are few studies that have investigated the patient experience of living with a PICC and none that have examined the impact of arm choice from the consumer's perspective.

Method: Participants were recruited in a hospital whilst they waited for PICC insertion. A purposeful sampling approach was used to select participants based on diagnosis types. Semi-structured telephone interviews were conducted November 2012– August 2013. Transcripts of the interviews were analysed using thematic analysis.

Findings: Ten participants were interviewed. Four themes were identified: (i) apprehension/ adaptation/ acceptance, (ii) impact of treatment, (iii) asking questions (trusting doctors) and (iv) freedom. Although initially apprehensive, participants adapted to the PICC and came to accept that the device allowed convenient access for treatment. This allowed them the freedom to receive treatment at home. The use of the dominant or non-dominant arm for PICC insertion had marginal impact on activities of daily living for participants. Auxiliary factors such as the infusion pump had a significant impact for those who received outpatient treatment. For those participants who did not understand the procedure, many did not seek clarification and trusted medical and nursing staff to make decisions for them.

Conclusion: Nurses should involve consumers in clinical decision-making and provide individualised information and support that facilitates adaptation for patients living with a PICC.

Keywords:

Nursing/ Nurses/ Peripherally Inserted Central Catheter/PICC/Patient experience/Qualitative description/Elastomeric infusion pump/Vascular access/ Peripheral intravenous catheter

Introduction

Peripherally inserted central catheters (PICCs) are vascular access devices used for medium to longer term treatment for a range of patient groups including those receiving chemotherapy and intravenous antibiotics. Traditionally PICCs were inserted by Interventional Radiologists; currently most PICCs are inserted by specially trained Registered Nurses (Moureau, 2006). These devices are often inserted for patients that undertake out of hospital or outpatient intravenous therapy (Hitchcock, Jepson, Main & Wickens, 2009; Caplan, 2012). These patients can have PICCs for weeks to many months, and on the whole self-manage the device at home. Their contact with clinicians varies depending on the treatment plan; some see clinicians daily, for others it may be less frequently.

The insertion of a PICC can have a significant impact on the lives of patients. For example, arm choice for PICC insertion (whether the patient's dominant or non-dominant arm is used) can impact on the person's activities of daily living. While insertion practices differ across practice settings, selection of which arm to insert the catheter is most often determined by the clinician with little input from the patient. Whilst clinical factors including vasculature and skin integrity assessment may determine which arm is used for insertion, often arm choice is pre-determined and is based on institutional norms or clinician convenience. Frequently, PICCs are inserted on the right side due to ease of insertion for the clinician, regardless of patient arm dominance (Sperry, Roskos & Oskoui, 2012). In other clinical settings, the non-dominant arm is used based on the perceived ease of self-care for the consumer (Philpot & Griffiths, 2003).

From the perspective of the patient as a consumer, there are no published studies that have addressed the patient's view of arm choice for PICC insertion and impact of that choice on activities of daily living. In fact, there are few studies that have explored the patient experience of living with a PICC. There is a need to determine the patient experience of a PICC to provide clinicians with an understanding of the consumer's perspective of living with this device in situ and managing self-care. Understanding the person's perspective of health care is a fundamental requirement of contemporary health service delivery and central to patient-centred care (Pelzang, 2010).

Most research exploring the patient experience of PICC insertion and impact of the device on daily life has focused on patients with a malignancy (Oakley, Wright & Ream, 2000; Molloy, Smith, & Aitchison, 2008; Nicholson & Davies, 2013). This research has been undertaken in oncology units in the United Kingdom (UK) in which participants received chemotherapy as outpatients. Although participants generally described satisfaction with the service and ability to be discharged home for treatment, they reported initial problems with undertaking activities of daily living including showering when self-managing at home (Oakley et al. 2000; Molloy et al. 2008).

The quality and quantity of information provided to patients was also identified as problematic (Oakley et al., 2000; Molloy et al., 2008). In these studies, difficulties were identified with the volume and complexity of information provided to participants, who were also found to be unable to retain much of the education provided to them. This is unsurprising as the provision of information about the PICC was in addition to information about diagnosis and the need for chemotherapy (Oakley et al., 2000; Molloy et al., 2008). This was in contrast to a more recent study that found no such problems with the information provided to a group of oncology patients

(Nicholson & Davies 2013). The participants' attitude toward the PICC also varied, with some viewing the device as the first step to treatment and cure, and others feeling that it was a reminder of their disease (Molloy et al., 2008; Nicholson & Davies, 2013). What seemed to emerge from these findings was that the context of cancer is difficult to separate from the participant's attitude toward living with the PICC in situ.

There is little research that has examined the experience of PICC insertion and impact of this device on daily living for those without cancer. Gabriel (2000) explored the experience of patients with malignancies and non-malignant health problems requiring a PICC in an outpatient clinic in the UK. Similar themes were found to research conducted in patients with a malignancy. Participants reported a positive attitude toward the device which prevented recurrent venepuncture and was associated with minimal discomfort. An initial adaptation process was described after which the device had marginal impact on usual daily activities.

However, no study to date into patients with a PICC has taken into consideration arm insertion site. It is unknown what impact arm choice has on the daily activities of people who have a PICC in situ. Further research exploring the experience of people living with a PICC should also include participants receiving outpatient intravenous antibiotics, who form a large segment of those discharged home with this device.

Method

Aim

The aim of this study was to understand the patient experience of PICC insertion and the impact of the device on activities of daily living including the significance of arm choice.

Design

A qualitative approach was used, a method that generally involves small sample sizes to gain an in-depth understanding of the participants' experience (Polit & Beck, 2004). Specifically, qualitative description was used to explore the experience of health consumers attending a hospital Radiology Department for insertion of a PICC. This is a method that seeks to describe phenomena in the language of the participants and focuses on the patient's experience rather than interpret responses from a conceptual framework (Sandelowski, 2000a). Data were collected from telephone interviews conducted by the researcher. A telephone interview design was chosen for the convenience of the participants and researcher. While some contend that gathering qualitative data from telephone interviews may be problematic due to difficulties with rapport building, others suggest this data collection method is as effective as face to face interviews (Musselwhite, Cuff, McGregor & King, 2007). The researcher was cognisant of the limitation of telephone interviews and emphasis on the establishment of rapport during the interview process was made. Openness was facilitated by the use of iterative questioning when uncertainty or ambiguity was apparent. An interview guide was developed which was guided by previous qualitative research exploring the patient experience of a PICC.

Ethical and influence considerations

Approval was granted by both the University of South Australia's and the hospital's Human Research Ethics Committee prior to the study's commencement (Protocol no. 0000030886 and 121001 respectively). Potential participants were given a written information sheet by the researcher and were allowed time to read it. After this, participants were invited to take part and written consent was obtained to conduct and record the interviews. Additionally consent was reaffirmed verbally at the beginning of each telephone interview. Whilst a Registered Nurse at the hospital where the study was undertaken, the primary researcher (RS) did not work in the

unit that inserted PICCs or have a clinical relationship with the participants prior to, or after recruitment which may have a coercive effect (Polit & Beck, 2004).

Sampling strategy

Participants were included if they were aged 18 years or over, assigned by their medical treating team to have a PICC inserted, and could read, write and understand English. Participants were excluded if they were unable to provide informed consent. As it was thought that participants would have different experiences based on treatment regimen, a purposeful sampling approach was used to select participants based on diagnosis types (haematological cancers, solid tumours, infection and those who required a PICC due to difficult venous access). This method was chosen to ensure that a range of patient experiences were included (Sandelowski, 2000b).

Data collection

The research was set in a public, metropolitan 680 bed hospital in Adelaide, South Australia. Initial data was collected November 2012–February 2013. A second round of data collection occurred between July–August 2013. Participants booked to have a PICC inserted in the radiology department of the hospital were invited to take part in the study.

Interviews

The principal researcher conducted semi-structured telephone interviews using a question pro forma to guide the interviews and gather data via open-ended questions from each participant. Box 1 outlines the questions included in the interview guide.

A hospital database was checked to obtain the patients' vital status prior to interview. An initial data collection round was conducted eight weeks post insertion via telephone interview. A similar time-frame was used in previous research in this area by Molloy and colleagues (2008) to allow the participants time to experience living with the PICC. The interviews were conducted

via telephone with speakerphone capability and digitally recorded with the participants' consent. A second round of data collection was conducted to ensure saturation.

Data analysis

Thematic analysis was used to identify common concepts within the dataset (Braun & Clarke, 2006). Immediately following each interview, recordings were transcribed verbatim by the researcher. This enabled the researcher to become familiar with the data and begin the process of data immersion. The transcripts were compared to the original recordings for accuracy. The transcripts were analysed sequentially and emerging themes were identified which were recorded as field notes which guided the subsequent interview. Data collection was conducted until saturation was achieved. This was determined when similar concepts were repeated and no new ideas were provided by participants. The researcher read through each transcript many times to gain an in-depth understanding of the data and identify meanings and emerging patterns. Relevant data extracts were then identified and coded. Each code was placed on a card and sorted/re-sorted into theme piles with similar content and meaning. The codes and themes were reviewed by the research team to assess for variability and consistency. The completed themes were compared to the entire dataset for fitness and were named (Braun & Clarke, 2006).

Trustworthiness

The trustworthiness of the findings was established with the use of investigator triangulation, provision of rich description and peer debriefing (Lincoln & Guba 1985). The degree to which the findings accurately reflect the experience of participants was facilitated with investigator triangulation. Another researcher read the transcripts, coded extracts and identified themes. Regular meetings were held to discuss and revise themes identified. Further, participants were asked to validate the researcher's interpretation of their responses during the interview process to ensure accuracy (Polit & Beck, 2004). A detailed description of the setting and participant

responses is provided to enable readers to determine if the findings are transferable to their clinical setting (Polit & Beck, 2004). Peer debriefing was undertaken with independent researchers experienced in qualitative research.

Findings

Participants

Initially 17 participants were recruited, however, at the time of interview it was found that one patient had died, two declined interview and four were unable to be contacted. A total of ten participants were interviewed and interview duration ranged from 9-43 minutes with the majority taking more than 16 minutes. Of these, eight had either exclusive outpatient treatment or were discharged home for treatment after initial inpatient treatment. Two participants were inpatients for their entire treatment period. Participants ranged in age from 45-80 years old and included six males and four females. Nine participants had a PICC for a period ranging from 14- 56 days. One participant still had the PICC in place at the time of interview. Half of the participants required the PICC for infections requiring medium to long-term intravenous antibiotics, with most of the remaining requiring the PICC for treatment of a malignancy (Table 1).

Themes

Four themes emerged from the data: i) apprehension/adaptation/acceptance; ii) impact of treatment; iii) asking questions (trusting doctors) and iv) freedom. Verbatim quotes from participants are given to illustrate themes with numbers given to each respondent to protect confidentiality.

Apprehension/adaptation/acceptance

Prior to the PICC insertion, participants were apprehensive about the insertion and potential complications resulting from the PICC. Participants spoke of a fear of needles which amplified their concern about the insertion; however, they went on to describe the insertion experience as uneventful. One participant described the administration of the local anaesthetic prior to the PICC insertion as akin to “being stabbed by a screwdriver” but the pain soon dissipated and he felt no discomfort after the insertion.

Participants were also concerned about the potential for complications arising from the PICC. The catheter location was a source of anxiety for some specifically that the tip terminated in the central circulation, close to the heart. This was perceived as frightening and there was a concern that this could result in an adverse event. The materials the catheter is composed of (which was described as a piece of plastic) and the time the device was left in their body, added to this apprehension, one participant commented that the

“..thought of that plastic line threaded down right next to my heart was a bit odd”

(#7)

Some participants felt that the use of their dominant arm for the PICC insertion might increase the risk of the catheter dislodging due to increased movement of this arm. However, these participants then went on to indicate that after a while they became less concerned about displacement and more confident in the adhesive dressing used to secure the device.

Some participants, however, did experience a complication. One participant, developed a deep vein thrombosis in the arm the catheter was sited which she described as painful (and resulted in the removal of the PICC). Nevertheless, she remained positive about having another PICC

inserted as clinicians had problems accessing her vasculature and she felt that having the device in situ meant less discomfort from multiple venepunctures.

Another participant had developed complications in the past (suspected catheter related blood stream infection) which resulted in the removal of four PICCs. On all occasions the catheter was not the source of infection (it was chemotherapy related). Interestingly, while both of these participants experienced complications they expressed little anxiety about adverse events related to the PICC. Instead they spoke positively about the PICC as an aid to their treatment and found removal and reinsertion of the device when complications did occur as an inconvenience rather than a potential life threatening incident. Both participants had haematological cancers and forefront to them seemed to be living with a chronic and potentially terminal illness. As one described

“...so far the only negative thing I can relate it to is having Leukaemia in the first place” (# 10)

Participants described an initial adaptation of personal care routines including showering and sleeping with the PICC in place. Participants found that showering at home with the PICC was the most difficult adjustment. Specifically, they reported problems protecting the dressing from moisture in the shower. Some participants explained that they had been given special PICC covers made from plastic with elastic at both ends by hospital staff. Others used household commercial plastic wrap to protect the area while engaging in hygiene activities. One participant described problems with moisture penetrating the plastic barrier and found it was better to keep her arm out of the shower area when possible.

Once participants had adapted to living with the catheter, they indicated the PICC then had little impact on daily activities. This was regardless of which arm (dominant/non-dominant) was used

for insertion. Perhaps this is because the PICC is inserted approximately ten centimetres above the cubital fossa region and as such the device sits quite high on the arm away from areas of flexion. Further, all patients were provided with an elastic arm band to cover the site and surrounding area of the arm to prevent the PICC becoming caught. Two participants experienced the PICC in both the dominant and non-dominant arms during the study period. Both stated that the arm used had a marginal effect on their daily life and they did not have a preference. However one participant indicated that he would have preferred the PICC to have been situated in the non-dominant arm. He explained that while the PICC in the dominant arm didn't cause problems with most daily activities, it did prevent him from continuing with his hobby of target shooting. This was due to the potential for the PICC to be damaged by the recoil action of the gun.

Participants reported reduced anxiety and acceptance of the device over time. Once they had experienced living with the PICC they became more comfortable with the catheter staying in place. They described the convenience of a device that allowed the infusion of their medications as well as the taking of blood samples, which made their treatment easier.

Impact of treatment

Participants described the biggest impact of living with a PICC came from auxiliary factors associated with the catheter. For those participants who received treatment out of hospital, the disposable infusion pump had a significant effect on their life, more so than the PICC. Most of the participants in the study received some or all of their intravenous therapy at home, administered via an elastomeric infusion pump, a disposable non-electronic portable system that infuses chemotherapy agents and antibiotics (Broadhurst, 2012). This infusion was connected to the PICC via an extension line which delivered the infusion continuously at a set rate over 1 -7

days, after which the infusion bottle was discarded and in many cases a new infusion bottle attached depending on the participants treatment regimen. Participants reported the need to be vigilant about the pump and difficulties with the infusion line catching on objects around the house.

“it got caught on things all the time...I was so glad to have that ... off.” (#7)

The management of these infusions in the home setting also impacted in other ways. Those participants that had the PICC to deliver intravenous antibiotics were visited daily in their home by community nurses to change the infusion. For these participants waiting around each day for the nurse to visit restricted any regular activities and they found the system limiting and inconvenient.

Participant’s specific medical condition and treatment also had a significant effect on their experience of living with a PICC. Several participants with malignancies described greatly reduced activity levels; however, it was difficult to determine if this was due to the device or the impact of their diagnosis and treatment regime. For some the PICC began to symbolise their disease and treatment progress, as one participant said,

“I think when you look at it ... it makes you think about the sickness you’re going (through) ... the day it came out it was a bit (of a) relief ... it felt like that was the first part of everything done, that came out chemo is over and so once it came out you feel like you’re starting to heal. (#1)”

Asking questions (trusting doctors)

Comprehension of the information provided during the consent process prior to PICC insertion varied. Some participants had previously had one or more PICCs and so already understood the

procedure. Many of those with no previous experience of a PICC described the information given by medical staff as minimal, technical and difficult to understand without previous knowledge of medical procedures. Worryingly, they also indicated that they did not understand the procedure when they signed the consent form.

“I didn’t realize the actual piece they put into you went right into your arm across your chest and up to your heart...”(#1).

Some participants described the need to be assertive and ask the medical staff to rephrase their description of the procedure so they could understand. Many had developed this confidence after previous experience with the often indecipherable language of the medical community. They described previous experiences where they had undergone procedures they had not understood which had taught them the need to clarify information.

“...if you’re not forward enough to do that then you wouldn’t understand...it’s your... body so you have to ask questions” (#8).

Other participants did not seek clarification from the medical officer if they didn’t understand the PICC insertion process prior to signing consent. They felt that the medical officers were more equipped to make decisions about their treatment plan due to greater knowledge and experience. They trusted that the doctor would make the right decisions about their treatment for them.

“I’m never one to argue with doctors if they’re telling me to do something I know it’s the way” (#5)

Freedom

Predominantly, participants held a positive attitude toward the PICC which allowed them the freedom to be discharged home to receive treatment. This allowed them to continue with their lives out of hospital which added to their quality of life.

“...personally I think they are one of the greatest inventions ever!..”(#6)

For the majority of participants the PICC had marginal impact and they were able to continue with normal activities once discharged. For some this meant that they continued with their usual exercise routine, leisure pursuits and returned to paid employment with the PICC in place. While many participants were no longer working due to illness or age, for those still in paid employment, the PICC had marginal effect on their return to work noting that these participants all worked in office based occupations. One participant who had the PICC for intravenous antibiotics noted that

“..I was discharged at noon I was sitting at my desk at 1 pm...”(#4).

Other participants described the PICC in positive terms as it freed them from further vascular access attempts. This group had experienced recurrent vascular access experiences prior to the PICC insertion as inpatients. For these participants, the PICC meant an end to these often traumatic repeated peripheral intravenous catheter insertions and blood taking procedures. This experience was exacerbated by those with chronic diseases that had multiple admissions and frequent vascular access attempts which had resulted in vein damage described succinctly by one participant as

“(my)...veins are knackered...” (#9)

This meant that peripheral intravenous catheter insertion became extremely difficult and many participants spoke of the dread that they felt whilst they waited for clinicians to try to insert peripheral intravenous catheters or attempt venepuncture. Often multiple clinicians (Registered Nurses and Medical Officers) would attempt to access their veins so that some participants underwent more than 10 attempts within a few hours.

“...you wait for each person to come in and try two or three times then leave empty handed then... next one same thing...next one same thing.... you (are) black and blue like a pincushion.” (#8)

Discussion

This study was the first in more than a decade that included participants without malignancies in the exploration of the patient experience of living with a PICC. The findings allow nurses some insight into the patient’s subjective experience of not only insertion but also managing this device out of hospital. This can help inform practice so that nurses may better understand and facilitate self-management for their patients living with a PICC.

The key findings of this study were that for these ten patients, the device itself and whether it was placed in the dominant or non-dominant arm, had marginal effect on the daily life of participants after a period of adaptation. This is in keeping with previous studies which found that over time participants found that they adapted well to living with a PICC in situ (Gabriel, 2000; Oakley et al., 2000; Molloy et al., 2008). Similarly, the majority of participants in the current study held a positive attitude toward the PICC on the basis that it provided convenient venous access that allowed out of hospital care. Improved treatment satisfaction among patients

living with a PICC due to the freedom this device provides to receive out of hospital care has been reported in previous research (Oakley et al., 2000; Molloy et al., 2008).

The present study has highlighted the need to improve communication during the consent process, the impact of the pump used for treatment at home and the trauma of difficult vascular access for consumers.

Information provision

Information provided by medical staff during the consent process was difficult to understand for some participants in this study. Further, whilst some participants did seek clarification when they didn't understand information provided, many did not. Nurses performing advanced practice roles such as PICC nurses should be aware that patients may not understand the procedure they are undergoing regardless of whether written consent has been obtained. It is important that nurses ensure that patients comprehend information provided so they are able to participate in informed decision-making. It is the responsibility of the clinician to assess existing knowledge levels so that information can be individualised to the needs of the patient and clarification sought to ensure that patients have fully understood the need for the device and potential complications (Infusion Nurses Society, 2011).

Further, information provided by nurses should not only be focused on the technical aspects of the insertion process, but also information about adapting to living with a PICC. This education should be tailored to the needs of the patient. Some participants in the present study described active lives after PICC insertion that included exercise, hobbies and return to paid employment. This is in contrast to previous research in oncology populations that described low activity levels (Oakley et al., 2000; Molloy et al., 2008). This suggests that PICC education should be individualised to facilitate existing activity levels and functioning of consumers to encourage

improved quality of life (Demiris et al., 2008). It is also important for nurses to be cognisant that it is a financial necessity for some consumers to return to paid employment with the PICC in situ. Support should be provided to streamline the transition back to paid employment following PICC insertion.

Outpatient treatment

Another unique finding of this study was the significant impact of the elastomeric pump (a portable pump that infuses medications over a 24 hour period) on daily activities. Participants found that the infusion line became caught and made many activities more difficult at home. Previous research did not discuss the effect of the device used to infuse medications on activity levels. This may be due to the population studied (those with malignancies) whose activity levels were already reduced (Oakley et al., 2000; Molloy et al., 2008). The increased burden of the infusion pump in the present study may also be due to the prolonged nature of the infusion. In previous research the infusion pump was connected for 46 hours then disconnected for a rest period. In the present study, participants were connected to the pump system for 24 hours a day for many weeks; one participant had an elastomeric infusion pump connected for 24 hours a day for 6 weeks.

Trauma of difficult venous access

Participants described the trauma of repeated unsuccessful peripheral intravenous catheter (PIVC) insertion and venepuncture for blood sampling that they experienced prior to PICC insertion. Repeated attempts to access the peripheral vascular system resulted in physical damage, with obvious bruised arms as well as psychological distress. Short-term PIVCs were not the focus of this study and participants were not specifically asked about their experience with these devices, but many participants described a history of difficulties with vascular access.

Vascular access problems have been identified as the most distressing part of treatment in some patient groups (Robinson-Reilly, Paliadelis, & Cruickshank, 2010). In the present study, the PICC was viewed as a saviour for these participants as it prevented further vascular access attempts, a finding also supported by previous research (Chernecky, 2001; Molloy et al., 2008). This is a concern as the insertion of PIVCs is one of the most common invasive procedures in a hospital, yet few resources are allocated to their insertion (Sado & Deakin, 2005). Further research exploring the patient experience of venepuncture and peripheral intravenous catheter insertion would determine the extent of distress this common procedure causes for hospitalised consumers.

Limitations

A relatively small number of participants (n=10) took part in the study and consistent with qualitative approaches, findings cannot be generalised to other populations living with a PICC. However, the in-depth understandings derived from using this method reflected similar findings of others (Gabriel, 2000; Oakley et al., 2000; Molloy et al., 2008). The use of telephone interviews may have hampered communication due to the absence of visual cues and greater difficulty with rapport building and this may explain the short duration of some interviews. Conversely, conducting face-to-face interviews in participants homes may have further limited the number of patients recruited as telephone interviews provided a convenient and secure means for participants to discuss their experiences. Recruiting participants from one health service may have reflected practices of that service and if the study was conducted at another site, experiences may have been different.

Future directions

The content and delivery of information given to patients about PICC insertion and living with the device could be improved with increased emphasis on individual information needs.

Technology affords the tools to deliver information that is relevant to patients and their information needs at a time and in a medium that is appropriate for them. An interactive internet or smart phone application using plain language to explain the procedure and offer guidance on living with a PICC may increase patient satisfaction (Neary et al., 2010). A tool which included patient stories and their experiences could provide a valuable resource for consumers and facilitate the adaptation process of living with a PICC (Oakley et al., 2000). Additional clinical recommendations are provide in Box 2.

Conclusion

The use of a PICC for vascular access was well tolerated by participants. Arm choice, or whether the patient's dominant or non-dominant arm was used for insertion did not have a significant impact on participants' activities of daily living. Patients requiring a PICC insertion should be provided with appropriate information so they can participate in informed decision-making, and emphasis should be given to provide individualised care that supports adaptation to living with a PICC and infusion devices.

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Box 1: Interview guide

- What was your experience of PICCs previous to the insertion?
- Tell me about the information you received about the PICC
- How was the PICC insertion for you?
- How was your life with the PICC in place?
- What impact did the arm used for the PICC have on your life?
- Tell me about the positive and negative aspects of the PICC

Table 1: Participant information

| No. | Age | Gender | PICC side | No. lumens | Arm | Previous PICC? | Previous no. PICCS | Insertion reason | Treatment | Treatment location |
|-----|-----|--------|-------------------|------------|------|----------------|--------------------|---------------------------|---|--------------------|
| 1 | 45 | M | R | 1 | D | N | - | Solid tumour | Chemotherapy | OPD |
| 2 | 59 | M | Both [±] | 2 & 3 | Both | Y | 5 | Haematological malignancy | Chemotherapy/ IVAB | In-patient/ OPD |
| 3 | 63 | M | L | 1 | D | N | - | Infection | IVAB | In-patient/ OPD |
| 4 | 60 | M | R | 1 | D | N | - | Infection | IVAB | In-patient/ OPD |
| 5 | 50 | M | L | 1 | D | N | - | Solid tumour | Chemotherapy | OPD |
| 6 | 46 | F | Both [±] | 3 | Both | Y | 2 | Haematological malignancy | Chemotherapy/bone marrow transplant /IVAB | In-patient/ OPD |
| 7 | 52 | M | R | 1 | D | N | - | Infection | IVAB | In-patient/ OPD |
| 8 | 57 | F | L | 1 | D | Y | 3 | Infection | Blood taking/ IVAB | OPD |
| 9 | 61 | F | L | 1 | N | Y | 3 | Infection | IVAB | In-patient |
| 10 | 80 | F | R | 1 | D | N | - | Difficult access | Blood products | In-patient |

[±]Patient had more than one PICC inserted between recruitment and follow up 8 weeks later. R= Right side, L= Left side, D= dominant arm, N = non-dominant arm; IVAB = intravenous antibiotics; PICC = peripherally inserted central catheter; OPD= treatment via an outpatient department.

Box 2: Clinical recommendations

Determine consumers anxiety levels prior to PICC insertion- provide emotional support where necessary

Assess comprehension of procedure and provide relevant and appropriate information

Provide practical information about living with a PICC at home including attached infusion equipment