

The experiences of patients and nurses with a nurse-led peripherally inserted central venous catheter line service

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Nurse-led Peripherally Inserted Central Venous Catheter (PICC) services are becoming commonplace in cancer centres across the UK. Research has shown that these services are cost-effective and are associated with fewer catheter-related complications, including infection and thrombosis, than skin-tunnelled catheters. This exploratory study aimed to explore patients' and nurses' experiences of a nurse-led PICC line service. Recorded interviews were conducted with 10 cancer patients with PICC lines inserted, five hospital-based nurses and five community-based nurses experienced in caring for patients with these lines. Respondents' recorded accounts were transcribed, coded and analysed to determine patients' and nurses' perceptions of the service and the extent to which collaborative practice was promoted. Findings were synthesized into five themes: Education, Formation of Expectations, Confidence, Sensory Experience and Adaptation. All respondent groups were positive about the PICC line service and the specialist oncology nurses working within it. The findings did identify some aspects of the service which could be improved, including the timing of information given to patients and the use of more innovative educational approaches. This study has informed the development of a potential flexible service structure which may be incorporated into established and differing care settings using existing resources. © 2000 Harcourt Publishers Ltd

Keywords: Peripherally Inserted Central Venous Catheter, cancer, nurse-led service, continuous ambulatory chemotherapy

Erfahrungen von Patienten und Pflegekräften mit einem von Pflegekräften geführten Dienstes eines peripheral gelegten zentralvenösen Katheters

Die von Pflegekräften durchgeführte Maßnahme peripheral gelegter zentralvenöser Katheter (PICC) wird im UK immer üblicher. Die Forschung hat gezeigt, dass diese Dienste kostengünstig sind und zu weniger Komplikationen, einschließlich Infektionen und Thrombosen, führen als subkutane Katheter. Diese Studie untersucht die Erfahrungen von Patienten und Pflegepersonal mit diesem von Pflegekräften durchgeführten PICC Service. 10 Patienten mit PICC Schlauch, fünf Krankenhauspflegekräfte und fünf Gemeindeschwestern mit Erfahrung im Pflegen Von Patienten mit dieser Art Schlauch wurden befragt. Die aufgezeichneten Erfahrungen der Befragten wurden verschlüsselt und analysiert, um die Wahrnehmung der Patienten und der Pflegekräfte zu bestimmen und festzustellen, in wie weit eine Zusammenarbeit aller Beteiligten gefördert wurde. Die Antworten wurden 5 Themenbereichen zugeordnet: *Schulung, Erwartungshorizont, Vertrauen, sensorische Empfindung und Einstellung*. Alle Befragten äusserten sich positiv in bezug auf den PICC-Schlauch Dienst und die fachliche Kompetenz der Krebs-Pflegekräfte. Die Ergebnisse zeigten einige verbesserungswürdige Aspekte des PICC Dienstes auf, darunter der Zeitpunkt, zu dem der Patient die Informationen erhält und die Anwendung innovativer Schulungsansätze. Diese Studie hat einen Beitrag zur Entwicklung einer potentiell flexiblen Dienstleistungsstruktur geleistet, die in bestehende und unterschiedliche Pflegesituationen, unter Nutzung existierender Mittel, integriert werden kann.

Experiencias de pacientes y enfermeros con un servicio de línea venosa central con catéter de colocación periférica guiada por un enfermero

Los servicios de línea venosa central con catéter de colocación periférica (PICC) guiada por un enfermero están pasando a ser comunes en centros de oncología de todo el Reino Unido. Las investigaciones han demostrado que estos servicios son eficaces en función de los costos y están asociados con una tasa menor de complicaciones relacionadas con el catéter, tales como infección y trombosis, que los catéteres con túnel en la piel. Este estudio

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exploratorio tenía por objeto examinar las experiencias de pacientes y enfermeros de un servicio de línea PICC guiada por un enfermero. Se hicieron entrevistas grabadas con 10 pacientes afectados de cáncer que tenían líneas PICC, 5 enfermeros de hospitales y 3 enfermeros comunitarios experimentados en la atención de pacientes con tales líneas. Los relatos grabados de los entrevistados se transcribieron, codificaron y analizaron para determinar las percepciones del servicio que tenían los pacientes y los enfermeros, y el grado en que se promovía una práctica de colaboración. Los resultados se sintetizaron en cinco temas: educación, formación de expectativas, confianza, experiencia sensorial, y adaptación. Todos los grupos de entrevistados se mostraron positivos con relación al servicio de línea PICC y los enfermeros oncológicos especializados que trabajaban dentro del mismo. Los resultados identificaron ciertos aspectos del servicio que podían mejorarse, tales como el momento del suministro de información a los pacientes y el uso de enfoques educativos más innovadores. Este estudio ha proporcionado información para el desarrollo de una estructura de servicio potencialmente flexible, que pueda incorporarse en entornos de atención establecida y variable, utilizando recursos existentes.

BACKGROUND

The insertion of Peripherally Inserted Central Venous Catheter (PICC) lines within the context of a holistic nursing service is gaining increasing popularity across the UK (Gabriel 1996). This trend is in response to ambulatory chemotherapy treatments and to patients requiring repeated venepuncture and cannulation which can cause psychological distress. Insertion of these soft silicone lines measuring 50–60 cm involves a minor surgical aseptic procedure. Venous access is obtained through a vein in the antecubital fossa, following the application of local anaesthetic. The correct positioning of the line in the superior vena cava is confirmed by chest X-ray. These lines may remain in position for 6 months.

Research investigating the effectiveness of PICC lines has shown inflammation of the vein and blockage of the line to be the most common problems affecting patients (Merrell et al. 1994). Other complications, including infection, are rare (Graham et al. 1991). The lines are cost-effective

(East 1994), with insertion performed on wards or in out-patient departments by trained nurses. This negates the need for theatre, medical personnel and hospital overnight stays. There is a tendency when alternative central lines (including skin-tunnelled lines) are inserted for the procedure to be delayed or cancelled, resulting in heightened anxiety for patients and disjointed care (Gabriel 1994). The insertion of the PICC line is less invasive than that required for skin-tunnelled lines and the former may be removed easily by nurses, leaving no scar. The PICC service provides a short response time for insertion (Hamilton et al. 1995) and can be incorporated into a service, which can promote continuity of care (Gabriel 1996).

The experience of patients with these lines and the perceptions of the nurses collaborating in caring for patients with them have yet to be determined. This was the focus of this study which explored nurses' and patients' views of a cancer centre's PICC line service. The service that was provided in the study centre is outlined in Figure 1.

SERVICE PROVIDED TO PATIENTS AND CARERS

Prior to Line Insertion

Written Information Filofax book. Contains information regarding: PICC line insertion, care and complications, ambulatory chemotherapy, and 24-hour contact telephone numbers for the hospital-based team.

Verbal Information Line insertion; shown the PICC line and pump; introduced to other patients if available.

Line Inserted

On the oncology day unit or ward.

Prior to Discharge Home

Verbal Information Care of the line and pump.
Possible complications.
Shown pump battery change.

Referral To Community Nurse

SERVICE PROVIDED TO NURSES

Formal Education PICC lines and ambulatory chemotherapy.

Supervised Practice Direct nurse supervision of caring for a patients with a PICC line. Including the dressing and chemotherapy bag change. Offered on patient referral.

Written Information Core PICC line and chemotherapy care plans.

Additional Support for Community Nurses 24-hour access to hospital-based oncology team
PICC line care pack which contains all equipment for care of the line.

Fig. 1 Original oncology nurse-led PICC line service for ambulatory chemotherapy.

The study explored the degree to which patient information needs were met and prepared them for the procedure and any associated changes in body image and sexuality. Ream and Richardson (1996) suggest that information empowers the patient to adapt to and cope with the diagnosis of cancer and its treatment. Information increases feelings of control through reducing anxiety and preparing patients for treatment. Sexuality and body image are affected by cancer and its treatment, including the intrusion of intravenous lines (Price 1990). The Royal College of Nursing (RCN 1995) noted that skin-tunnelled central lines, although providing long-term central venous access, can constantly remind patients of their disease status.

The study also explored the education provided to community and hospital-based nurses to prepare them for managing patients with PICC lines. The degree to which communication links had been established between community and hospital-based nurses was an additional focus of the study. Such links can increase patient confidence in the care that they receive and minimize catheter complications (Oakley 1997). Collaborative practice encourages negotiation between multidisciplinary team members and the development of a collaborative treatment plan (RCN 1996).

METHOD

The purpose of this study was to explore the experiences of patients with PICC lines and of nurses, both in the hospital and community, caring for them. Following approval from the hospital ethics committee community and hospital senior nurse managers and medical oncologists, a convenience sample of five community nurses, five ward nurses and ten cancer patients were recruited to the study.

The hospital nurses in the study were working on the oncology ward and were invited to participate in the study in person. The community nurses were based in the local borough and were invited to participate by telephone. Nurses were selected to participate if they were caring for patients with PICC lines at the time of the study, had a minimum of 6 months experience of these lines, and had cared for at least three patients with PICC lines during the previous year. The sample of nurses included individuals with a range of experience from those with limited experience to those with extensive post basic training. Their average age was 32 years.

Patients were invited to participate in the study before having a PICC line inserted for ambulatory 5-Flourouracil chemotherapy. Additional selection criteria for the patients included the ability to understand and speak English, to have a diagnosis of cancer, be over the age of 18 and have no psychiatric history. The patients ranged in age from 42–80 with a mean age of 61 years. They were predominantly male and Caucasian. They were being treated for a variety of cancer types all requiring continuous infusion 5-Flourouracil chemotherapy. Demographic details of the patient and nurse subsamples are summarized in Tables 1 and 2 and the interview schedules are presented in the Appendix.

Patient interviews

The patient interviews were conducted in quiet, private surroundings and were tape-recorded with the subjects' consent to enable the researchers to accurately recall the discussions. Two interviews were performed. The first was conducted within 24 hours of the line insertion and enquired about preparation for the procedure and the sensory experience of line insertion. The second interview was conducted 3-4 weeks after

Table 1 Demographic details of patient sample

Patient	Age	Sex	Ethnic Origin	Cancer Diagnosis	Treatment
1	80	M	Caucasian	Anus	Cont 5FU and RT
2	74	F	Caucasian	Cervix	Cont 5FU and Carboplatin
3	42	M	Caucasian	Colon	Cont 5FU
4	61	F	Asian	Ovary	ECF
5	52	M	Caucasian	Stomach	ECF
6	52	M	Caucasian	Stomach	MCF
7	68	M	Caucasian	Rectum	Cont 5FU
8	62	M	Caucasian	Squamous cell skin	Cont 5FU and Cisplatin
9	65	F	Caucasian	Stomach	ECF
10	52	M	Caucasian	Oesophagus	ECF

Cont 5FU, Continuous 5 Fluorouracil;
ECF, Epirubicin, Cisplatin, Continuous 5 Fluorouracil;
MCF, Mitomycin C, Cisplatin, Continuous 5 Fluorouracil;
RT, Radiotherapy.

Table 2 Demographic details of nurse sample

Nurse	Age (years)	Oncology experience	Qualifications	How long employed in current position	Experience with PICC lines
Ward nurse 1	30–40	7 years	RGN/ENB 237, 931, 998	6 years	7 months 20 lines
Ward nurse 2	30–40	4 years	RGN/ENB 237, 998 BA (Hons) Nursing Dip Counselling	2 years	3 years 10–15 lines
Ward nurse 3	20–30	1 year	RGN/ENB 998	1 year	1 year 10 lines
Ward nurse 4	20–30	17 months	RGN	11 months	1 year 10–20 lines
Ward nurse 5	20–30	3 years	RGN/ENB 998, 934, 237	4 months	2yrs 6mths 10–20 lines
Community nurse 1	40–50	No specific experience	RGN/DPSN/ENB 998, 931	2 years	6 months 3–4 lines
Community nurse 2	20–30	1 year	RGN/BSc DPSN	1 year	14 months 2 lines
Community nurse 3	30–40	No specific experience	RGN/DPSN		2 years 3 lines
Community nurse 4	40–50	No specific experience	RGN/DPSN	8 years	9 months 3–4 lines
Community nurse 5	20–30	6 years	RGN/ENB 237	1 year	16 months 2 lines

ENB 237, Oncology Nursing;
ENB 934, Care of persons with HIV/AIDS;
ENB 931, Care of the Dying;
ENB 998, Teaching and Assessing;
DPSN, Diploma in Professional Studies Nursing.

insertion of the PICC line. This interview enquired about patients' experiences of living with the line and ambulatory pump, and of available sources of support. Since the timing of interviews can pose a threat to the validity of research (Hutchison 1992), the interviews were scheduled to allow patients time to recover from the procedure before exploring their experiences of the line insertion and of living with the PICC line and ambulatory pump.

Nurse interviews

The nurses were interviewed once to determine their experiences of PICC lines, collaborative practice and their preparation for managing PICC lines. They were conducted in private rooms away from the immediate work environment. This ensured there were minimal disruptions during the interviews which, like the patient interviews, were recorded.

All of the interviews were guided by schedules of open and closed questions. Patton (1987) states that questions in qualitative interviews should be open-ended, sensitive and clear to the interviewee. The questions in the schedule were designed to reflect these criteria.

The researchers were aware of the possibility of social desirability bias, especially in the nurse subgroup (Carter 1984), where the presence of the researcher biases respondents' accounts. To reduce this, and give respondents a greater feeling of anonymity, the researcher with whom they had least daily professional contact

conducted the nurse interviews. Likewise, to avoid bias in the patient subgroup, the interviews were not conducted by the nurse who had placed the patients' PICC line. To ensure greater reliability, the interviews were transcribed, read and reread and their content coded and analysed independently by three experienced oncology nurses, who identified common descriptors. These nurses sought themes which were repeatedly mentioned by the subjects and which appeared central to their experiences.

RESULTS

The five themes evident in the data were education, formation of expectations, confidence, adaptation and sensory experience. Four themes were common to both patients and nurses and the section below will include data from each. One theme, sensory experience, related solely to the patients' experience.

Education

This theme relates to the patients' perceptions of the education they received to prepare them for the insertion of the PICC line and to their subsequent living with it. In addition, the theme synthesizes nurses' perceptions of their own and their patients' education needs. All patients felt sufficiently prepared for the line insertion. Nine patients felt reassured and less anxious by the

information provided, as one patient commented:

Information is... a good thing because it doesn't let people's imagination run away with them.

(patient 10)

Although all patients had received the same written and verbal information prior to the procedure, differing aspects of these were alluded to by them. This may reflect their individual educational needs and learning styles. Five patients referred to the benefits of the written information, nine patients to the benefits of verbal information and three to the value of prior viewing of the pumps and PICC lines. Two patients felt that they could have learned from patients who had experienced PICC lines, either from a comments book or from talking with them. One gentleman explained:

I could have spoken to the ones two or three up the line, 'then how did you get on all right mate'. I think that might have helped.

(patient 10)

Nine patients stated that they had received enough information to enable them to manage the line and pump at home. However, in spite of being shown how to care for the pump, seven patients had telephoned for help when the pump had alarmed. In four cases the battery required changing. These patients were unable to recognize the problem, requiring the district nurse or hospital to change the battery. Difficulty in retaining information was noted by five patients, one commenting that:

I was still upset about having to have chemotherapy... it just wasn't registering with me.

(patient 2)

This highlighted the importance of the timing of information giving. Five patients felt this should be imparted at their own pace, and taken.

...step by step...

(patient 1)

All of the nurses interviewed felt sufficiently prepared to care for patients with PICC lines and considered informal, ongoing training and advice from specialist nurses the most effective and supportive training method. All of the ward nurses and three of the community nurses had received informal training by an oncology nurse, who had supervised their care of patients with PICC lines. However, only one community nurse had attended a lecture on PICC line care, whilst another had received no training. The care plan, provided to all nurses managing PICC lines, was felt by the majority of nurses ($n=9$) to reinforce their informal training. Lack of knowledge was identified by four ward nurses as the cause of

complications, including the manifestation of blocked or split lines. One nurse stated:

It doesn't happen regularly, but it's got the potential of happening if people haven't had the education on them.

(ward nurse 2)

All of the ward nurses commented on the importance of providing information to relieve patient anxiety before the PICC line is inserted and on educating them on the care of the line.

Formation of expectations

This theme addresses patients' expectations of the PICC insertion procedure. Patients' expectations were influenced by anxiety and their preconceived notions about it. Eight patients did not know what to expect from the PICC line placement despite receiving written and verbal information about the procedure. This resulted in two patients misunderstanding the positioning of the line and two expecting the procedure to be uncomfortable, one commenting that:

Well you don't know what to expect... I was expecting it to be a little bit painful but I really can't grumble at all.

(patient 9)

The ability to retain information for six patients appeared to be confounded by anxiety prior to the line insertion. One commented:

I mean I didn't sleep last night because I was so worried...

(patient 2)

Four patients were influenced by past experience of clinical procedures. Two patients found this helpful. However, a further two found their needle-phobia increased their anxiety of the PICC procedure. A small group of patients ($n=3$) were concerned about potential complications arising from the tip of the line resting in their heart. In addition, one of these patients was concerned that the line could fall out or become infected, or that the pump could be damaged.

Three of the ward nurses expressed negative views regarding the insertion of PICC lines, perceiving this as frightening for the patient. One ward nurse commented:

The thought of, you know, something going up your arm into your ... It's a bit scary really and hard to imagine...

(ward nurse 1)

Confidence

This theme describes both patients' and nurses' feelings of confidence. It describes patients' confidence in the nurses inserting the line, and their growing confidence in managing the line

and pump away from the hospital. In addition it incorporates the nurses' reflection on their own confidence in caring for PICC lines and the benefits of collaborative care in promoting their own and patient confidence. Patients perceived that their confidence during the insertion of the PICC line was promoted through the caring manner of the nurses inserting the lines. All patients considered these nurses caring, expert practitioners:

I think she's very knowing at what she does.

(patient 1)

Patients suggested that confidence at home was increased by the support of community nurses ($n=8$), by family support ($n=4$) and through the 24-hour support offered by the oncology department ($n=9$). Four patients had telephoned the hospital or district nurse with problems but reported increased confidence after these had been dealt with successfully. Interestingly, three of these patients had a low battery.

...I phoned the district nurses and two nurses came...and it was the battery...I wouldn't be frightened next time.

(patient 11)

All of the nurses felt confident caring for patients with PICC lines. Ongoing support from specialist nurses was seen as particularly important for community nurses who had infrequent contact with this group of patients, one stating:

It's good to have a knowledge base that you can phone up because it's a very specialised subject.

(community nurse 1)

All of the ward nurses referred to the beneficial collaborative practices that had developed between the hospital and community nursing teams. These included a referral process to the community team for all patients with PICC lines and the attendance of community nurses at informal training sessions. In addition, three nurses stated that community nurses were able to phone into the hospital for advice.

Three community nurses found collaborative practices between the hospital and community nursing teams particularly supportive. Three of the ward and three of the community nurses linked this to increased patient confidence. They suggested that patient confidence was promoted through continuity of care. One ward nurse stated:

...and it's a good thing for the patient as well cause there's a confidence in that they can see that...everybody's doing the same thing.

(ward nurse 1)

Ward nurses commented on potential confusion between PICC and skin-tunnelled lines. They highlighted a need to ensure that the

community nurses are trained in PICC line care when patients are referred to the community. Community nurses commented on their need for information when patients were admitted to the hospital and consistency in information concerning PICC line management.

Sensory experience

This theme explored the patients' experiences of the PICC line insertion, and included the cognitive aspects of this. Nine patients reported that the line placement was less traumatic than they had anticipated. One patient expressed this by stating:

...if that happens to everybody then they've got nothing to fear...

(patient 2)

Three patients were surprised at the speed of the insertion. The majority of the patients ($n=8$) found this less uncomfortable than expected and three patients found it painless. Three patients mentioned a hint of movement and a slight pressure, with four commenting on the sting from the anaesthetic. However, this was not perceived as painful. Exploration of the visual aspect of the procedure resulted in two patients stating they chose not to view the procedure, and a further two commenting on the lengthy preparation:

...nine tenths of the waiting time was the prep...It looks really surgical with everything coming out...I could see people getting really anxious about it.

(patient 3)

Adapting to living with the line

Patients discussed their day-to-day living with their line and pump, whilst community nurses referred to their involvement in promoting patient adaptation to this. All nurses perceived advantages and disadvantages of PICC lines for patients. All patients appeared to adjust well at home, six continued to undertake household chores whilst four patients did not comment on this. Two were able to continue driving, however, due to the open nature of the research questions it was unclear if this was an issue for the remaining sample. Nine patients were often unaware of the line and pump, commenting:

I can hardly feel any difference from that arm to that arm it's very comfortable...It's very fine and very light...you hardly notice it.

(patient 7)

Only one female patient referred to alteration in her body image as a result of the PICC line in her 'bad arm'. She found it distressing when other people enquired about it. Social attitudes

also appeared to have had an impact on perceived body image for two other patients. One commented that people might have seen the line but been too frightened to ask what it was. Another stated that friends had said that they wouldn't want the line in because it 'goes in the heart'. Both said that this did not upset them. However, patients were required to introduce some adaptations to their lives. Of the six working patients, one felt he could continue working, whilst five manual workers expressed concerns, including:

I'm very sceptical of obviously going to work, it's a dirty job.

(patient 5)

Although it appeared that the line and pump restricted patients' ability to work, this may have been influenced by their illness also.

Further adaptation was required for sleeping ($n=7$) and for clothing ($n=5$), most notably for an Asian woman who was unable to wear her sari blouse. Other patients were specific about how they wore the pump and spoke of their quick adaptation to threading the tubing through their clothing. In addition, all patients had made changes to their bathing routines. Three found this disruptive, one commenting:

If you're lying with one arm hanging out you haven't got that relaxation.

(patient 3)

Protection of the line and pump was a concern for all of the patients, especially during bathing ($n=10$), sleeping ($n=5$), manual work ($n=3$) and for two patients who stressed social circumstances, one of whom commented:

I'm a bit wary of people in crowded places in case anyone bashes into me.

(patient 5)

The only patient with young children expressed that he was careful with his line and pump stating:

They all know that it's dad's medicine and they don't touch it when they sit next to me they just watch the line...Which arm is it dad...come and sit on the other side then...

(patient 3)

Although patients felt that they had made adaptations to enable them to manage the line and pump successfully, four patients felt that this was insignificant compared to the importance of treatment, one patient stating:

...it's the cancer that's the big thing, the line is nothing.

(patient 3)

Ward nurses did not comment on patients' adaptation to living with the line. However, four

community nurses provided patient guidance on recognizing complications and advice on bathing, dressing and sleeping. One community nurse expressed this by stating:

...normally I suggest they put a chair next to the bath and put the machine on there.

(community nurse 1)

Three ward and two community nurses felt that PICC lines cause less alteration in patients' body image than skin-tunnelled central catheters, as PICC lines were less intrusive and easy to conceal under the dressing and long sleeves. However, one community nurse commented on the possibility of negative patient body image in the summer when short sleeves may be worn. Protection of the line and pump was mentioned by four ward and all of the community nurses. However, the position of the line in the patient's arm and the secure dressing over the line was thought to offer protection and subsequent security for the patient. One ward nurse commented:

...it's out of sight, it's not something that's on their neck, that they're afraid of catching as much because we can put the dressing...we can tuck it all in and they don't have it hanging.

(ward nurse 1)

Two ward and three community nurses considered the lines fragile. All ward nurses had experienced blocked lines which had split when flushed. Two nurses linked this to blood transfusions, one commenting:

...they tend to get blocked quite easily if they're not flushed immediately...They're quite temperamental sometimes, especially if you're trying to give blood through them.

(ward nurse 2)

Community nurses experienced less technical problems than ward nurses when caring for the lines, although individual nurses had experienced difficulties with valve failure, with blood extraction and kinking of the line.

The main findings from the study have been summarized in Figure 2. Concentric circles have been used as means of demonstrating where

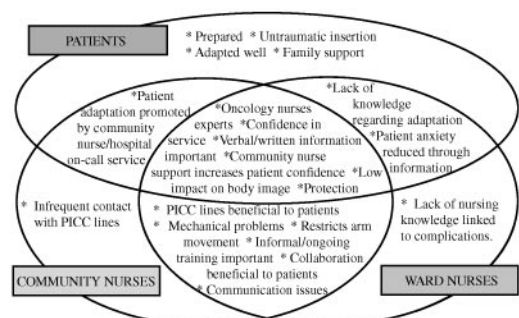


Fig. 2 Summary of main findings.

overlap in perceptions occurred between one or more respondent groups.

DISCUSSION

Forming expectations / sensory experience

Despite advice and reassurance about the line insertion and aftercare, the patients in the study expected the procedure to be painful and did not know what to expect on discharge home. This appeared to be due to their previous experience and preconceived ideas of the procedure. The influence of these factors has been stressed by Turk et al. (1986) and Contrada et al. (1994). However, the patients did not find the procedure distressing. It appeared that this misconception could be addressed through improved information provision. Education should be provided at an optimal time and in a suitable manner. Rhodes et al. (1994) suggest that the patient should be prepared for steps involved in the procedure and how they are likely to feel during it.

Education

The most important finding of this study was that while there was a high level of satisfaction with the PICC line service, this could be improved through tailoring information to individual patients' and nurses' needs. Cooley et al. (1995) stated that cancer patients have individual information requirements and that multiple methods of providing information are required. The National Cancer Alliance (1996) explored the needs of cancer patients in the UK. Their report stated that patients ideally prefer a combination of written and verbal information. This study supported the notion that education reduces patients' anxiety and increases their confidence, in this case with PICC lines. However, information should be provided at patients' own pace (National Cancer Alliance 1996). This is especially important when the care is provided in a busy out-patient department. Patients' readiness and ability to learn should be assessed and opportunities for education maximized and reinforced over time. This study also found that patients value speaking with others in similar circumstances, echoing previous findings (National Cancer Alliance 1996). This should be possible and encouraged whenever appropriate.

Concerns regarding the diagnosis of cancer, impending line insertion and start of chemotherapy treatment appeared to increase patients' anxiety and confound their ability to retain information. However, this is not surprising as poor recall has been noted in previous studies exploring the information needs of chemotherapy

patients (Dodd & Mood 1981, Dodd 1982, Ream & Richardson 1996). Ream and Richardson's (1996) review of the literature described the potential for anxiety to impede the retention of information in patients with cancer. This confirms the importance of assessing patients' learning readiness and evaluating the efficacy of educational effort.

This study demonstrated the importance of ongoing informal training in the care of patients with PICC lines by specialist oncology nurses, especially for nursing personnel in the community. This enabled the community nursing team in this study, who had infrequent contact with this group of patients, to care for the lines confidently and competently. Such training appears to reduce catheter-related complications (Graham et al. 1991) and enables the nursing team to update their skills and knowledge.

Adaptation and confidence

Patients in this study adapted well at home with the support of community nurses, their families and the hospital-based oncology team. Home nursing for cancer patients has been shown to reduce distress, promote independence and benefit psychosocial outcomes, particularly mental health and social dependency (McCorkle et al. 1994). Social support, whether from family, friends or health-care professionals, is stressed as important by Reville and Almadrones (1992) as being in place for home treatment.

The framework of collaborative practice explored in this study aimed to meet the requirements of the Royal College of Nursing document 'A Structure For Cancer Services' which states that:

'The success of home based treatment is dependent on multidisciplinary, flexible and collaborative working practices involving the specialist cancer team and those working in primary healthcare services.'

(RCN 1996)

This framework for providing a PICC line service encourages negotiation between multidisciplinary team members to make decisions regarding intravenous treatment settings, resulting in a collaborative treatment plan. The inclusion, education and support of the primary health-care team are continuous considerations.

Nurses and patients perceived that collaborative working implemented in the PICC service improved patient confidence and enhanced the continuity of their care. The data from this study also suggested that patients' confidence during the insertion of the PICC line was enhanced by the knowledgeable care provided by the nurses carrying out the procedure. Although the personal attributes of the specialist nurses were not

investigated in this study, it is probable that these impacted on patients' perceived confidence. Previous work has determined that patients appreciate care provided by cancer nurses who provide them with information and emotional support, and encourage active involvement in decision making. These are attributes that Bottorff et al. (1995) suggest provide comfort to patients with cancer and by their very nature are likely to enhance confidence. The hospital studied had a specialist nurse who provided teaching for the community nurses. Vooght and Richardson (1996) described the contribution of this nurse and demonstrated the importance of their role in promoting patient confidence and providing assistance for nurses caring for central venous lines in the community.

PICC lines were seen as beneficial by patients, any inconvenience being overridden by the necessity to have treatment. The respondents with PICC lines rarely mentioned restricted arm movement. Also, alteration in body image associated with skin-tunnelled lines (RCN 1995) did not appear to be a problem for this group of patients. Some patients described how they were still able to continue with everyday activities, including driving and performing housework. As this was not discussed with all of the subjects, it was difficult to ascertain whether they were typical. Such information would be of interest and a survey of the impact of PICC lines on

everyday living could usefully be performed in the future. PICC lines were seen as fragile and the patients and nurses were aware of the need to protect the line and pump. The community nurses reported fewer technical problems with split or blocked PICC lines than the nurses based on the oncology ward. This may relate to the reduced handling of the line in the community, which has been observed by Graham et al. (1991). It was encouraging that the nurses had not experienced infected lines and this reflected findings from a 3-year audit of PICC lines (Goodwin & Carlson 1993). They found infections to be rare, attributing this to the low number of bacteria present on the arm compared with the chest.

Recommended changes to the service

This study identified key features which, if implemented, would improve the PICC line service that was studied. These improvements are outlined in Figure 3. This study identified the necessity to explore patients' preconceived notions regarding the PICC line insertion. Any fears which are not accurate may then be allayed.

Patient confidence in the service may be increased by using patient quotes in written patient information. Confidence may also be enhanced by introducing patients to those who have experience of the PICC line service. Some

SERVICE PROVIDED TO PATIENTS AND CARERS

Prior to Line Insertion

Holistic Patient Assessment	Explore preconceived ideas about line insertion, Assess level of anxiety.
Written Information Pack	Give filofax book. This contains information regarding PICC line insertion, care and complications, ambulatory chemotherapy, 24-hour contact numbers to the hospital-based team and quotes from patients who have experienced the service.
Preparatory Verbal Information	Discuss the line insertion, show the PICC line and pump, introduce to other patients if available.
Audio Visual Information	Show video on line placement and adaptation to living with the line and pump away from the hospital.

Insertion of Line

Prior to Discharge Home

Verbal Information	Discuss the care of the line and pump, possible complications, pump battery change and provide advice on adaptation, including bathing, dressing and protection of the line and pump.
Referral to Community Nurse	

SERVICE PROVIDED TO NURSES

Formal Education	Provide teaching sessions on PICC lines and ambulatory chemotherapy. Show video on line placement and patient adaptation.
Supervised Practice	Offered on patient referral: Direct nurse supervision of PICC line care including the dressing, flushing the line and chemotherapy bag change.
Written Information	Provide core PICC line and chemotherapy care plans, this should include information on patient adaptation.
Additional Support For The Community Nursng Team	24-hour access to the hospital-based oncology team. PICC line care pack contains all equipment for care of the line.

Fig. 3 Optimal PICC Line Service.

patients may benefit from an educational video demonstrating the insertion of a PICC line, the procedures required to care for the line and pump, and the available support from the community and hospital-based teams. The information provided by the service could be improved by focusing on patient adaptation to living with the line and ambulatory pump away from the hospital.

This study suggests that training for nurses should focus more on patient adaptation, especially for nurses based within the hospital. Community nurses promoted patients' adaptation at home and have knowledge that would benefit nurses in the hospital. Communication difficulties noted by the ward and community nursing teams require addressing through closer liaison. Further training, with the use of the patient information video, would be valuable. Such a video could provide all nurses with more insight into the patients' experience, and promote consistency in the information which the nurses are giving to their patients.

This study has highlighted the benefits of a second in-depth assessment of patients' recall of information and ability to cope with the PICC line. This could be provided by the oncology nurses at the hospital on a follow-up visit. Alternatively, community nurses could be trained to provide such a service.

Limitations of the study and recommendations for future research

The generalizability of the findings to the wider population could be questioned, due to the small sample size. However, this study provides primary evidence of patients' and nurses' experiences of PICC lines. Patients' needs should be explored further to identify the optimal way to educate and care for patients with PICC lines receiving continuous ambulatory chemotherapy. As the study was conducted in the spring, further investigation should incorporate data collected during the summer months. Seasonal variation may impact on patients' perceived body image as during warm weather they may wish to wear short-sleeved clothing. A comparative study of patients' experiences of PICC and skin-tunnelled lines, and their impact on altered body image, would further increase awareness of the impact of invasive lines. Future research could also focus on the impact of a second assessment and information provision session on the patients' ability to adapt to the PICC line and ambulatory pump.

In future, the impact of extended coaching and training methods to increase and maintain nurses' knowledge of the management of PICC lines could be studied.

CONCLUSION

This small study described patients' and nurses' experiences of PICC lines. The main themes alluded to by them were education, formation of expectations, confidence, adaptation and sensory experience. Although patients conveyed their satisfaction with the PICC service, their insights enabled the researchers to identify areas of particular importance for patients coping with PICC lines. The provision of effective education is paramount for enhancing confidence throughout the service. The basis of an optimal PICC line service is outlined in Figure 3. Departments considering setting up a similar service to the one outlined in this study are advised to consider the education and support needs both of their patients and the hospital and community nurses caring for them.

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APPENDIX

INTERVIEW SCHEDULES

Patient interview 1

Experience of PICC line insertion

We would appreciate your descriptions of what you experienced before, during and after the placement of your PICC line.

- How long did you have to wait from the PICC line being mentioned to the actual placement of the line ?
- How did you feel before the PICC line was placed ?
- What preparation did you have for the PICC line insertion ?
- What did you notice when the PICC line was being placed ?
(For example this may be feelings on your skin, sounds, sights or smells experienced during the placement of your line).
- Was the placement of the PICC line what you expected?
(If not, how did it differ)
- Is there anything else you would like to tell us about your experience today ?

Patient interview 2

Support and information

- What information did you have before the PICC line was put in ?
- Do you feel you had enough information to enable you to adapt to having a PICC line ?
- What other information would have been useful to you ?
- How do you feel about being away from the hospital with your PICC line ?
- Who is available to help you with your PICC line ?
- Who has actually helped you with your PICC line ?
- How many times have you had to telephone for help with your PICC line ?
- And to whom ?
- Was all this sufficient ?

Living with the line and the pump

- Was the experience of living with the PICC line in place what you expected ?
- How has the PICC line affected your work life ?
- How has the PICC line affected your home and social life ?
- How has the PICC line affected your sleep ?

- How has the PICC line affected the type of clothes that you wear ?
- What changes have you made to your personal hygiene care as a result of your PICC line ?
- How has the PICC line affected how you view your self and how others view you ?
- Is there anything else you would like to add?

Nurse interview

Support and information

- When did you start caring for patients with a PICC line ?
- How many PICC lines have you cared for in the last six months ?
0–5 6–10 11–15
- What kind of preparation did you receive to enable you to care for PICC lines ?
- Who gave you that training ?
- Was that sufficient to enable you to feel confident to care for PICC lines ?
- If it were not sufficient what would you have liked ?
- Have you encountered any difficulties caring for PICC lines ?
- What are they ?
- Have you any ideas about how these difficulties could be minimized ?
- What is the relationship like between hospital and secondary care concerning PICC line management ?
- What are the benefits of this collaborative practice, if any ?
- What are the negative aspects of this collaborative practice if any ?
- Who would you contact if you had any concerns about your patient's PICC line ?

Quality of life

- What do you feel are the benefits for a patient when they have a PICC line in place ?
- What do you feel are the negative aspects for a patient when they have a PICC line in place ?
- Have you any suggestions about how these negative aspects could be minimized for the patient ?
- Is there anything else you would like to add ?