

# Effect of video-assisted education on informed consent and patient education for peripherally inserted central catheters: a randomized controlled trial

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## Abstract

**Objective:** To evaluate the effects of a video-assisted education intervention on informed consent and patient education for peripherally inserted central catheters (PICCs).

**Methods:** We conducted a randomized controlled trial comparing the effects on informed consent of video-assisted patient education and traditional face-to-face discussion in a catheter outpatient ward of a cancer centre in Guangzhou, China, in 2018. Participants were 140 patients randomly allocated (1:1 ratio) to two groups: video-assisted or traditional intervention. General information, patient retention of PICC-related information, working time spent by nurses on the procedure, and patient and nurse satisfaction with the procedure were assessed.

**Results:** The time used for informed consent was significantly shorter in the experimental group ( $1.02 \pm 0.24$  minutes) than in the control group ( $6.87 \pm 1.10$  minutes). The time used for PICC-related education was significantly shorter in the experimental group ( $1.03 \pm 0.28$  minutes) than in the control group ( $5.11 \pm 0.57$  minutes). Nurses' degree of satisfaction with the procedure was significantly higher in the experimental group ( $4.10 \pm 0.57$ ) than in the control group ( $2.60 \pm 0.70$ ).

**Conclusion:** The use of video-assisted informed consent and patient education in this cancer centre decreased nurses' working time and improved nurses' satisfaction.

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## Keywords

Peripherally inserted central catheter, video-assisted, patient education, informed consent, randomized controlled trial, outpatients, China

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## Introduction

Peripherally inserted central catheters (PICCs) have the advantage of reducing pain from repeated peripheral vein puncture, reducing the incidence of catheter-related complications and protecting veins.<sup>1–3</sup> PICCs are widely used in medium- and long-term intravenous infusion in chemotherapy patients.<sup>4,5</sup> Furthermore, PICC bedside placement is convenient for both patients and providers;<sup>6</sup> thus, the use of PICCs has grown steadily in recent decades in China.<sup>7</sup>

In China, most hospitals have catheter outpatient centres for PICC line insertion and central venous catheter maintenance. In these centres, nurses must explain the PICC line insertion procedure, obtain informed consent<sup>8</sup> and educate patients about proper care of the PICC line. Traditionally, a nurse explains these points through a discussion with the patient. Because there is a large amount of information to cover, this process is time-consuming for nurses and affects their other work. Both patients and nurses have complained about the current PICC insertion procedure.

Education methods can be categorized as oral, written and video materials.<sup>9</sup> Compared with the other two methods, video materials are more vivid and easier to convey and transport, and they can reduce labour cost, which makes them suitable for outpatient education.<sup>10</sup> Therefore, we designed two videos (one on PICC line patient education and one on informed consent). We evaluated the effects of the

video-assisted education intervention on informed consent and patient education for PICCs.

## Methods

The study was a prospective, randomized controlled trial conducted in 2018 at the Sun Yat-sen University Cancer Center (SYSUCC) in Guangzhou, China. The study was approved by the institutional ethics review board and has clinical trial registration status (ChiCTR1800015664).

### *Inclusion and exclusion criteria*

A total of 140 PICC insertion patients were randomly assigned in a 1:1 ratio to an experimental group or a control group. The experimental group received video-assisted patient education about informed consent and the PICC procedure, and the control group received a traditional face-to-face discussion. The inclusion criteria were as follows: 1) patients aged 18 to 75 years; 2) patients who had finished primary school; 3) patients having a PICC line inserted for the first time; 4) patients receiving catheter maintenance in our hospital; and 5) patients who agreed to participate in the research and provided written informed consent. The exclusion criteria were any contraindications of PICC placement.

### *Sample size and random allocation*

We referred to data on PICC-related knowledge before and after the use of

video-assisted education in PICC placement reported by previous studies, which indicated pre-intervention knowledge rates of 78% and post-intervention knowledge rates of 98%.<sup>11,12</sup> According to a two-sided power calculation and formula for comparison of the two sample rates,<sup>13</sup> a sample size of 126 participants would ensure a power of 0.90, given a significance level of 0.05 (chi-square test). Considering a dropout rate of 15%, we needed a sample size of 140 (70 in each group). Patients were randomly assigned in a 1:1 ratio to an experimental group or a control group using a computer-generated, permuted-block randomization scheme. We used a sealed envelope to hide the randomization scheme.

### *Video preparation process*

1) A video production coordination group was assembled comprising a vice chief nursing officer (group leader), three PICC nurse specialists, three intravenous infusion therapists and a video production expert. This team reviewed the literature for relevant research and was responsible for the preliminary development of the video.

2) A literature review was used to analyse existing types of PICC-related informed consent and health education content in China. The video production coordination group established the preliminary content of the video according to the literature and then wrote the first draft of the video script, including video chapters, contents of each chapter, filming location, filming time and video subtitles. We used expert discussion (10 experts) to determine the final draft of the video script. The inclusion criteria for the experts were as follows: 1) nursing expert on PICC; 2) has published papers in at least two journals; 3) nurse manager of class 3 and grade A hospitals and 4) has worked as a nurse for at least 10 years. The coordination group discussed and

organized the final script. The videos were recorded according to this final script.

3) The main chapters and content of the informed consent video were as follows: 1) self-introduction and video content explanation by the PICC specialist; 2) description of the PICC catheter and its role; 3) the cost of management and the need for management; 4) the coordination of the PICC before and after placement; 5) informed consent, including explanations of the possible complications and consequences; and 6) signature using a role-signing video. The video was approximately 8 minutes long. The main chapters of the PICC-related patient education video were as follows: 1) considerations on the first day after the PICC line insertion; 2) considerations on the second day; 3) considerations about patient daily activities; 4) frequently asked questions and answers for the patients. Most chapters used a role-playing video presentation. The video duration was approximately 8 minutes.

4) We wrote the script ourselves and nurses participated as actors. Therefore, this stage of the video development was free. We then engaged a company to record and produce the videos; the total cost of the video production was approximately 5000 yuan (approximately 700 USD).

### *Intervention method*

*Experimental group.* 1) Informed consent: following confirmation of the doctor's instructions, the nurse took the patient to the education room and played the video. When the video had ended, the nurse returned to the education room, answered the patient's questions and collected the signed informed consent form. 2) PICC-related patient education: patients need to press the wound for half an hour after the PICC line insertion. During this period, the nurse gave the education manual to the patient and played the video in the

education room. Patients could watch the video repeatedly until they understood its contents, and nurses answered any of the patients' questions. The patient then received a routine X-ray examination to check the catheter location.

**Control group.** 1) Informed consent: following confirmation of the doctor's instructions, the nurse took the patient to the evaluation room, prepared the informed consent form and gave the patient a verbal explanation. Following this, and after answering any questions the patient had, the nurse asked the patient to sign the informed consent form. 2) PICC-related patient education: patients need to press the wound for half an hour after the PICC line insertion. After this period, the nurse gave the education manual to the patient and verbally explained the education content in the evaluation room. Following this, the patient received a routine X-ray examination to check the catheter location.

**Effect assessment.** The main outcome was the retention of PICC-related information.

The secondary outcomes were nurses' working time for the procedure, patient satisfaction and PICC nurses' satisfaction with the work process.

**Data collection.** The data collected comprised general information, patients' retention of PICC-related information (determined using a questionnaire), nurses' time spent on the informed consent and patient education (recorded after the procedure), patients' degree of satisfaction with the procedure and nurses' degree of satisfaction with the procedure. We designed a questionnaire to assess patient retention of PICC-related information. Patients completed the questionnaire the day after the PICC insertion and patient education had finished.

For the experimental group, the time taken for the intervention included the implementation of the video, patient questions and nurses' answers to those questions when the video had finished. For the control group, the time taken for the intervention included the explanation of the content of informed consent and PICC-related education, patient questions and nurses' answers to those questions during the procedure. One researcher acted as the time-keeper; she used the same stopwatch to record the total time the nurses took for the procedure.

The questionnaire on patient retention of PICC-related information comprised 10 items in the form of single and multiple-choice questions. The questions measured PICC retention time, PICC indications, the amount of weight the PICC can support, what activities can be performed, what activities cannot be performed, the frequency of PICC maintenance, PICC complications, precautions when taking showers, precautions for PICC fractures, and when patients should return immediately to the hospital. A correct response on each question was worth 1 point, and the total possible score was 10 points (higher scores indicated greater retention of PICC-related information). The 10 experts we enrolled also helped to evaluate the questionnaire's content validity index (CVI). Each item had four response options: 1 = no correlation, 2 = weak correlation, 3 = strong correlation, 4 = very strong correlation. Expert ratings of 3 or 4 indicated that the representativeness of the item was good. The CVI was the average of each item-level CVI, and was 0.81. A preliminary survey of 20 patients was conducted. Data analysis of these preliminary results showed a Cronbach's  $\alpha$  of 0.72.

We used a 5-point Likert self-designed questionnaire to test patients' and nurses' degree of satisfaction with the procedure. Possible scores were very dissatisfied (1), a

little dissatisfied (2), not sure (3), satisfied (4) and very satisfied (5). The total possible score ranged from 5 to 1 (higher scores indicated greater satisfaction). The patients' degree of satisfaction with the procedure was established after the procedure, and the nurses' degree of satisfaction with the procedure was established after the research was completed.

Before the research began, we organized a research team consisting of a coordinator, a research assistant and an experienced PICC specialist. The coordinator oversaw the research process, including the design of the experiment and the data analysis. The research assistant oversaw the questionnaire collection and used unified guidelines for patients. The PICC specialist placed all the PICCs, obtained the informed consent and educated the patients.

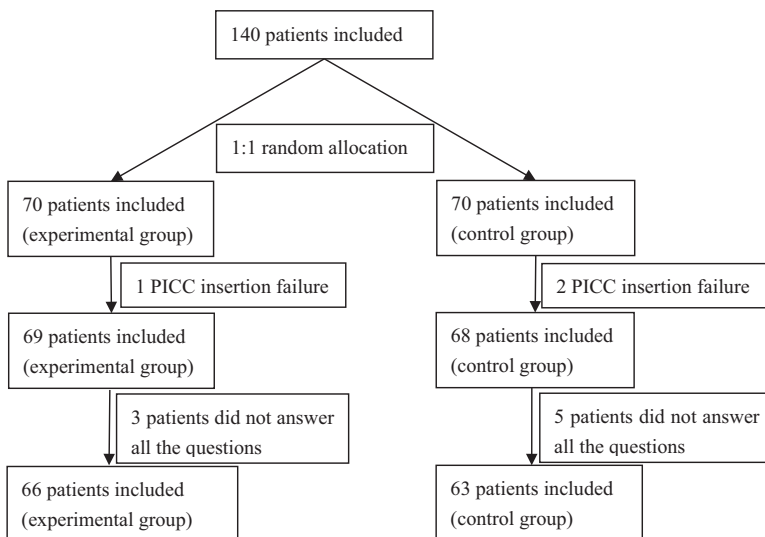
**Data analysis.** The data were recorded and analysed using IBM SPSS Statistics for Windows, version 19.0 (IBM Corp., Armonk, NY, USA). The t-test, chi-square test and Mann-Whitney rank test were used to analyse the data. The

significance level was 0.05. Descriptive data are presented as means and standard deviations.

## Results

### General information

A total of 98% (137) of the 140 PICCs were successfully inserted; data for 8 of the 137 PICCs had to be excluded. Therefore, we analysed data for 129 PICCs (66 in the experimental group and 63 in the control group). A detailed flow chart of the data collection is shown in Figure 1. The male:female ratio was approximately 2:1, most patients were 30 to 50 years old and most had a level of literacy higher than junior high school. Most patients had a family income of more than 3000 yuan (per month), most had medical insurance (patients must pay approximately 30% to 50% of their medical costs) and most were inpatients (>74%). All the PICCs were used for chemotherapy, and half were also used to administer total parenteral nutrition. There was no significant difference in



**Figure 1.** Flow chart of the data collection. PICC, peripherally inserted central catheter.

demographic data between the two groups; detailed results are shown in Table 1.

### Patient retention of PICC-related information

Table 2 shows patient knowledge of PICC-related information. There was no significant difference in total score between the

experimental group ( $8.97 \pm 0.99$ ) and the control group ( $9.10 \pm 0.80$ ) and no significant between-group score on individual items. The scores for the following questions were high ( $\geq 0.95$ ): 'How long is the PICC indwelling time?', 'Which activities can you do with a PICC?', 'What precautions should you take when taking a shower?' and 'What do you do if a PICC

**Table 1.** Comparison of demographic data for the experimental and control groups (n = 129).

	item	Experimental group (n = 66) (%)	Control group (n = 63) (%)	$\chi^2$	P
Sex	Male	44 (66.7.1)	41 (65.1)	0.04	0.85
	Female	22 (33.3)	22 (34.9)		
Age (years)	61–75	4 (6.1)	8 (12.6)	4.18	0.39*
	51–60	10 (15.2)	6 (9.5)		
	41–50	20 (40.0)	13 (20.6)		
	31–40	18 (30.3)	18 (28.6)		
	18–30	14 (21.2)	18 (28.6)		
Marital status	Unmarried	4 (9.1)	4 (6.3)	1.95	0.49*
	Married	61 (92.4)	55 (87.3)		
	Divorced	1 (1.5)	4 (6.3)		
Education level	Primary school	8 (27.3)	13 (20.6)	3.84	0.41*
	Junior high school	27 (20.0)	19 (30.2)		
	Senior middle school	14 (40.9)	12 (19.0)		
	Junior or regular college	16 (24.2)	19 (31.2)		
	Master's degree	1 (1.5)	0 (0)		
Profession	Institution administrator	11 (16.7)	9 (14.2)	3.97	0.70*
	Service provider	2 (3.0)	3 (4.8)		
	Technical job	7 (10.6)	10 (15.9)		
	Worker	12 (18.2)	8 (12.7)		
	Farmer	3 (4.5)	1 (1.6)		
	Businessperson	2 (3.0)	5 (7.9)		
Family income per person (yuan/month)	<1,000	10 (15.2)	9 (14.3)	6.43	0.38
	1,000–1,999	7 (10.6)	15 (23.8)		
	2,000–2,999	12 (18.2)	12 (19.0)		
	3,000–3,999	15 (22.7)	7 (11.1)		
	$\geq 4,000$	22 (33.3)	20 (31.7)		
Patient type	Outpatient	17 (25.8)	16 (25.4)	4.00	0.41
	Inpatient	49 (74.2)	47 (74.6)		
Medical cost payment	Own expenses	8 (4.0)	8 (4.2)	4.51	0.31*
	Urban medical insurance	39 (50.0)	31 (45.8)		
	Rural medical insurance	17 (36.0)	16 (28.0)		
	Public expenses	2 (10.0)	8 (14.6)		

Values are n (%).

\*P-value of Fisher's exact probability test.

**Table 2.** Between-group comparison of patient retention of PICC-related information (n = 129).

Item	Experimental group (n = 66)	Control group (n = 63)	t	P
1. How long is the PICC indwelling time?	0.97 ± 0.11	0.97 ± 0.18	-0.47	0.93
2. What are the indications for a PICC?	0.89 ± 0.31	0.92 ± 0.27	0.52	0.60
3. How much weight can you carry with a PICC?	0.85 ± 0.36	0.86 ± 0.35	0.14	0.89
4. Which activities can you do with a PICC?	0.98 ± 0.12	0.98 ± 0.13	-0.03	0.97
5. Which activities can you not do with a PICC?	0.85 ± 0.36	0.92 ± 0.27	1.28	0.20
6. How often should the patient perform PICC maintenance?	0.91 ± 0.29	0.98 ± 0.13	1.89	0.06
7. Which is not an abnormal situation with a PICC?	0.83 ± 0.36	0.86 ± 0.35	0.37	0.781
8. What precautions should you take when taking a shower with a PICC?	0.95 ± 0.21	0.86 ± 0.35	-1.916	0.06
9. What do you do if a PICC breaks?	0.95 ± 0.21	0.95 ± 0.22	-0.06	0.95
10. In which situation should patients return immediately to the hospital?	0.77 ± 0.42	0.79 ± 0.41	0.29	0.78
Total score	8.97 ± 0.99	9.10 ± 0.80	0.79	0.19

PICC, peripherally inserted central catheter. Scores are means ± standard deviations.

**Table 3.** Between-group comparison of nurses' working time for the procedure (minutes) (n = 129).

Working time	Experimental group (n = 66)	Control group (n = 63)	t	P
Informed consent	1.02 ± 0.24	6.87 ± 1.10	42.20	<0.001
PICC-related education	1.03 ± 0.28	5.11 ± 0.57	52.05	<0.001
Total	2.05 ± 0.36	11.98 ± 1.31	59.11	<0.001

PICC, peripherally inserted central catheter. Scores are means ± standard deviations.

breaks?" The scores for the following questions were low ( $\leq 0.85$ ): 'How much weight can you carry with a PICC?', 'Which activities can you not do with a PICC?', 'Which is not an abnormal situation with a PICC?' and 'In which situation should patients return immediately to the hospital?'

### Procedure working time

Table 3 shows the time spent by nurses on this procedure. The time used for informed consent in the experimental group (1.02 ± 0.24 minutes) was significantly shorter than in the control group (6.87 ± 1.10 minutes) ( $P < 0.001$ ). This saved 5.85 minutes per patient. The time used for PICC-related

education in the experimental group (1.03 ± 0.28 minutes) was significantly shorter than in the control group (5.11 ± 0.57 minutes) ( $P < 0.001$ ), saving 4.08 minutes per patient. The total working time of the two procedures for the experimental group (2.05 ± 0.36 minutes) was significantly shorter than for the control group (11.98 ± 1.31 minutes) ( $P < 0.001$ ), saving 9.93 minutes per patient.

### Patients' and nurses' degree of satisfaction with the procedure

There was no significant between-group difference in the patients' degree of satisfaction with the procedure (experimental

group:  $4.47 \pm 0.43$ ; control group:  $4.78 \pm 1.31$ ). The nurses' degree of satisfaction with the procedure in the experimental group ( $4.10 \pm 0.57$ ) was significantly higher than in the control group ( $2.60 \pm 0.70$ ) ( $P < 0.001$ ).

## Discussion

The results show that a well-designed informed consent and patient education video reduced nurses' working time and improved their satisfaction, and did not reduce patient satisfaction or retention of PICC-related information.

For PICC informed consent, we still use a face-to-face discussion approach in China because patients prefer to receive most information from a nurse.<sup>14</sup> However, the present findings show that a well-designed video does not reduce patient satisfaction. Sowen et al.<sup>8</sup> also found that patients receiving both a video and a traditional information condition were highly satisfied with the process. Another study showed that videos can improve patient satisfaction.<sup>15</sup> This may be because videos allow patients to view the information several times until they fully understand it, which may increase the acceptability of the procedure. In the present study, after patients had watched the video, nurses only needed an average of 1 minute to answer any of the patient's questions, which makes the video approach more effective. Additionally, two patients in the control group reported they were not ready for a face-to-face consent discussion and would like to view the video material to prepare themselves for the discussion. This tendency to prefer video education to face-to-face information reflects the findings of Sowen et al.<sup>8</sup>

Video-assisted systems can help patients obtain more information and improve patient retention of PICC-related information.<sup>6,16</sup> Our findings show that video-assisted informed consent did not reduce

or improve patient retention of PICC-related information, possibly because the score of both groups was already high, especially for items patients are most concerned about, such as indwelling time, activity, considerations when taking a shower and catheter fracture.<sup>17</sup> Video education has the advantages of providing comprehensive, standardized and easy-to-assimilate information, and it provides sufficient time for patients to reflect on that information. To improve the effectiveness of video education, more systematic, patient-centred and evidence-based approaches are needed for video design.

Regarding time saving, the two procedures saved 9.98 minutes ( $\pm 0.95$  minutes), which is approximately 10 minutes per patient. This result is similar to findings by Stuedemann et al.<sup>18</sup> In our catheter outpatient centre, we placed 20 PICC lines every day for a total of 200 minutes a day. China and many other countries are facing a severe shortage of nurses,<sup>19</sup> and nurses have hectic schedules. This procedure can reduce nurses' working time for informed consent and patient education, thus reducing their workload (which is why the nurses were more satisfied with the video procedure). In the hospital where the study was conducted, a reduction of 200 minutes from nurses' workloads could reduce costs by 563 yuan (169 hours a day), which would benefit the hospital.

## Study limitations

There are some study limitations. First, we did not record PICC complications; however, as there was no significant between-group difference in patient retention of PICC-related information, we assumed there would be no difference in complications. Second, we used a simple method for the video design; an evidence-based method should also be used to examine the effect of the video design. Third, we did not measure



knowledge before the procedure, which may have affected the results. The selected participants received PICC line insertion for the first time, so we predicted that they would have little prior knowledge of the procedure. Therefore, we believe that this limitation did not have a substantial effect on the results. Fourth, scores were low for four of the PICC questions. We plan to improve the video and emphasize the contents of these questions in a later version. Fifth, videos are not suitable learning devices for all patients. Patients with normal cognitive ability can benefit from them; however, other patients may require a face-to-face approach. However, the video method does have some advantages: this new procedure is very simple and effective, and could be easily and widely used in hospitals.

### Implications for nursing

The excessive workload of cancer nurses has become a worldwide health care issue;<sup>20</sup> thus, more effective working procedures are needed. PICC lines are a widely used clinical procedure for cancer patients. Informed consent and PICC-related education are necessary, but are paid little attention; there is generally more focus on improving the insertion method (e.g., with ultrasound and electrocardiography guidance).<sup>21,22</sup> There is a need to improve both PICC procedure and skills. The new procedure investigated here is simple, low cost, effective and easy to use; thus, it could replace the traditional face-to-face discussion.

### Conclusion

The use of video-assisted informed consent and patient education in cancer centres can reduce nurses' working time and improve their satisfaction. This educational method did not reduce patients' knowledge

retention or satisfaction. Thus, this method should be widely used. To improve the effectiveness of video education, more systematic, patient-centred and evidence-based approaches are needed for video design. In addition, more research is needed on video-assisted education interventions used in other procedures.

### Data availability statement

The data generated during and analysed in this study are available in the Research Data Deposit depository (<https://www.researchdata.org.cn/default.aspx>), ID number RDDA2020001646.



### Declaration of conflicting interest

The authors declare that there is no conflict of interest.

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