

Peripheral Venous Catheters in 1594 Adults Patients

presented by

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Introduction

Peripheral venous catheters (PVCs) reached 99% in tertiary hospital in China (2013).

How about its clinical status?

Especially related complications:

Phelebits? occlusion?

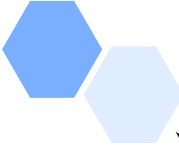
catheter related infection? infiltration?

Whether exists misunderstanding during its application?

Objective

- To investigate the related situation of peripheral venous catheter (PVC) in adult patients
- To provide evidence base for the standard use of PVCs

Materials and Methods

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- Patients were selected from 14 governmental hospitals in Hunan Province. The sample size was calculated to detect equivalence at 20.35% (equivalence margin 4%) with 5% significance and more than 90% power. This determined a total sample of 1311 patients, plus 20 percent to allow for attrition.

Materials and Methods

A total of 1594 adult patients with PVCs were selected from all cities in Hunan Province by multi-stage sampling.

Inclusion criteria

- ① Age at least 18years
- ② with an PVC in place

Exclusion criteria

- ① Blood stream infection
- ② Participated in another related research

Materials and Methods

Tool

➤ General information

Age, Gender, Education level, Job, Diagnosis

➤ Catheter-related information

a. Catheter characteristic: Catheter type and gauge, Connector type

b. Insertion site

c. Flushing and Locking: Solution, Technique, Time

d. Activities of the limb

e. Outcomess: complication, removal interval, reason for removal

Inter-rater reliability testing was done by expert consultation with scores between

3.74~5.00.

Materials and Methods

Key point

- Investigation form: By self-design “Observation Form of PVCs”
- Investigators: clinical nurse
- When and How to fill in the questionnaire?

Before the insertion, fill in the general information by medical record; after insertion, fill in catheter-related information by patient's follow up.

- Quality control: Each department arrange a liaison to be responsible for research development. Nurses who inserted the PVC need at least 2 years experience in catheter insertion to insure the quality of insertion.

Materials and Methods

Statistical analysis

- Data were entered directly into SPSS (Version 18) for analysis. Descriptive statistics, including mean, standard deviation, frequency, and percentages, were used to summarize and describe the demographic and clinical characteristics of the sample.

Results

Patient characteristics

Participants were aged 18~92(57.42 ± 26.48), other information were presented in table 1

Table 1 General information in 1594 patients

Variable	n(%)
Gender	
Male	831(52.13%)
female	763(47.87%)
Educational level	
Junior school or lower	1200(75.28%)
Associate degree	318(19.95%)
Bachelor degree or higher	76(4.77%)
Department	
Cardiology	214(13.4%)
neurology	182(11.4%)
neurosurgery	98(6.1%)
General surgery	186(11.7%)
oncology	777(48.7%)
Respiratory	58(3.6%)
bone surgery	79(5.0%)



Results

Catheter -related features

Including catheter type and gauge, connector type. closed safety PVC accounted for 94.67%, 50.25% of patients used protective connector caps, most of the catheter type (51.38%) were 24G.

Table 2 Catheter features in 1594 patients

		n(%)
Catheter structure		
	closed safety PVCs	1509(94.67%)
	Open PVCs	85(5.33%)
Catheter type		
	18G	135(8.47%)
	20G	113(7.09%)
	22G	508(31.87%)
	24G	819(51.38%)
	other	19(1.19%)
Connector type		
	Heparin	789(49.50%)
	Pressure	555(34.82%)
	Luer Access Split Septum	246 (15.43%)
	others	4(0.25%)



Results

Injection site-related characteristics

Forearm accounted for 35.76%, hand were the most (45.92%). Other information were shown in table 3

Table 3 Infusion site in 1594 patients

Infusion site		n (%)
	Finger	45 (2.82%)
	Back of the hand	732 (45.92%)
	Wrist	117 (7.34%)
	Forearm	554 (35.76%)
	Cubital fossa	22 (1.38%)
	Upper arm	81 (5.08%)
	others	54 (3.39%)



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Results

Flushing and Locking-related characteristics

Including solution, solution volume, technique and time. Flushing with normal saline accounted for 80.93%; Pulsatile flushing technique accounted for 86.20%; Flushing after blood transfusion accounted for 19.63%, only 17.06% was locked after infusion of high concentration solution.

Table 4 Flushing and Locking situation in 1594 Patients

		n (%)
Solution		
	Normal Saline	1290 (80.93%)
	Heparin sodium solution	304 (19.07%)
Solution volume		
	2ml	63 (3.95%)
	5ml	1129 (70.83%)
	10ml	394 (24.72%)
	Others	8 (0.50%)
Technique		
	Pulsatile flushing	1374 (86.20%)
	Continuous low-flow	218 (13.68%)
	Others	2 (0.13%)
Time		
	Before infusion	1316 (82.56%)
	After infusion	1514 (94.98%)
	After blood transfusion	313 (19.64%)
	After high concentration solution	272 (17.06%)

Results

Activities of the limb-related characteristics

Table 5 Activities of the limb with catheter (n=1594)

	n (%)
1. Position of upper limb while not in bed	
Drooping for more than 1 hour	725(45.5%)
Raise forearm for more than 1 hour	519(32.6%)
Others	350(29.9%)
2. Daily activities	
Lift 2kg or more	55(3.5%)
Sleep on the side of the catheter	724(45.4%)
Finger flexing and stretching	902(56.6%)
Symptoms such as vomiting, coughing, constipation, and agitation	240(15.1%)
Carrying bottle to the toilet	632(39.6%)
Blood reflux during infusion	386(24.2%)
3. Measuring blood pressure on the catheter side	99(6.2%)

Results

Outcomes

Reason for catheter removal was mostly by completed the treatment(35.9%), followed by reached the expected indwelling time (33.4%) and complications (30.6%). The top three complications were: occlusion (19.4%), extravasation (12.7%), phlebitis(7.3%). See table 6.

Table 6 cathetr-related complications (n=1594)

	n(%)
occlusion	309(19.4%)
extravasation	202(12.7%)
phelebits	116(7.3%)
Accidental removal	39(2.4%)
CRBSI	10(0.6%)
All BSI	8(0.5%)
Venous (local) infection	8(0.5%)
Any infusion failure	529(33.2%)

Discussion

Nurses' awareness of safety protection is improved

- Nurses' application of closed PVCs accounted for 93.67%
- needleless connectors accounted for 50.25%
- Infusion therapy standards of practice (America) : The primary purpose of needleless connectors is to protect health care personnel by eliminating needles and subsequent needlestick injuries.

Discussion

Nurses need to be further trained in the use of PVCs

➤ 2016 INS standard

using the forearm to increase dwell time, decrease pain during dwell time, promote self-care, and prevent accidental removal and occlusions.

➤ Survey results

Forearm accounted for 35.4%, far less than that reported in Australia(81%), The back vein of the hand is the most (45.9%)

It is necessary to strengthen the compliance of the INS guidelines in clinical practice and attach importance to the action promotion of the application of clinical research results.

Discussion

Flushing and locking time is the content that needs to be focused

- Standard requirement: pulsatile flushing technique is suitable for flushing before and after infusion

Survey result: continuous low-flow techniques accounted for 13.68%

- Standard requirement: vascular access should be flushed before and after blood transfusion.

Survey results: Flushing after blood transfusion accounted for 19.63%, only 17.06% was locked after infusion of high concentration solution

Discussion

Incorrect flushing and locking and inadequate patient education contributes to catheter-related complication

- catheter-related complications: occlusion (22.90%), extravasation (12.67%), Phlebitis(7.28%).
 - a. incorrect flushing and locking
 - b. have not flushed in time after blood reflux
 - Measuring blood pressure on the catheter side limb account for 19.95%
 - Carrying infusion bottle to the toilet account for 39.65%
 - c. Patient education
 - Upper limb dropping for more than 1 hour accounted for 40.84%
 - Lift 2kg or more accounted for 22.9%
 - Sleep on the side of the catheter accounted for 45.42%

Conclusion

Clinical nurses 'awareness of safe use of PVCs has improved. However, insertion site, flushing and locking techniques and the patient's education need to be improved to reduce complication.

Thank you



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