An Investigation into 15 Patients' Experiences with Mini-Midline Catheters and Tubes

Qingbo Han *

Posted Date: 23 December 2024

doi: 10.20944/preprints202412.1982.v1

Keywords: Mini centerline conduit; familiarity with tube placement; Fieldwork

Article

An Investigation into 15 Patients' Experiences with Mini-Midline Catheters and Tubes

Han Qingbo

Navy Qingdao Special Service Recreation Center, Qingdao

Abstract: Objective: To explore the real experiences of patients with mini - midline catheters, thereby providing a basis for comprehensive and effective nursing. Methods: Fieldwork was carried out to recruit 15 patients from the thoracic and cardiac surgery department in a Grade - A hospital in Yunnan Province who had received mini - midline catheters. Results: The patients using mini - midline catheters faced problems such as a lack of product - related knowledge, insufficient information support

Keywords: Mini centerline conduit; familiarity with tube placement; Fieldwork

---

Mini-midline catheters have been employed in clinics as medical technology has advanced. A mini midline catheter is a peripheral venous infusion device that is positioned between a medium-length catheter and a short cannula. It is typically inserted into the forearm's superficial vein using a traditional puncture technique or into the upper arm's deep vein using an ultrasound-guided technique. The catheter's tip does not extend past the axillary region, and it is 6 to 15 cm long. Its specification is 3F to 5F, and its indwelling period is typically one to four weeks. The model weighs 16 G to 23 G. The catheter's length and specifications affect its flow rate [3 and 4]. Currently, 8 cm (20 G or 22 G) and 10 cm (18 G) are the most popular varieties in China. Polyurethane is used to make the catheter. According to Fabiani et al., the mini-midline catheter's economic cost is one-sixth that of the medium-long catheter. However, further research and discussion are required in the future due to the significant disparity in the cost of tube insertion and maintenance in China and elsewhere, as well as the dearth of high-quality studies conducted in China to support the validity and reliability of this result. When it comes to practical safety (complications), economy (catheterization and maintenance costs), and timing (catheterization and indwelling times), the mini-midline catheter is superior to other catheters.

Through observation and targeted interviews, field research—also referred to as field research—is a survey and research method that gathers first-hand data and does qualitative analysis [6]. As a result, the field study served as a resource for clinical nursing research by examining the requirements and conundrums faced by patients undergoing thoracic and heart surgery who have mini-midline catheters.

1. Data and Methods

1.1. General Information

The study object, designated P1-P15, consisted of 15 patients who had mini-midline catheterization in the cardiothoracic surgery department of a Grade III Grade A hospital in Yunnan Province between June and August 2024. Table 1 displays the patients' general information. The patients' clear consciousness and normal cognitive and communication abilities were prerequisites for inclusion. The patients also had to have a mini midline catheter punctured for the first time while in the hospital. Engagement of patient resources. Patients who refuse to communicate, are physically weak and unable to handle being interviewed, or have serious illnesses, confused consciousness, or communication disorders are excluded.

 doi:10.20944/preprints202412.1982.v1

Table 1. General Data Of Field Subjects.

Encoding	Gender	Age	Educational level	Diagnosis	NRS score	Number of first puncture	Mini catheter type
P1	Male	54	Junior middle school	Heart valve replacement	3	2	Type C
P2	Male	26	High school	Spontaneous pneumothorax	2	1	Type A
P3	Female	66	Junior middle school	Lung cancer	5	2	Type C
P4	Male	14	Junior middle school	Chicken breast	4	1	Type A
P5	Male	52	Junior middle school	Rib fracture	3	1	Type A
P6	Male	68	University	Mediastinal tumor	2	1	Type C
P7	Female	58	University	Aortic dissection	2	1	Type A
P8	Female	63	Junior middle school	Rib fracture	3	1	Type A
P9	Male	70	Junior middle school	Hiatal hernia	2	1	Type C
P10	Female	64	High school	Lung cancer	3	1	Type C
P11	Male	24	High school	Spontaneous pneumothorax	2	2	Type A
P12	Male	39	University	Rib fracture	1	1	Type A
P13	Female	49	High school	Lung cancer	3	1	Type A
P14	Male	15	Junior middle school	Removal of chicken chest internal fixation	4	1	Type A
P15	Female	30	University	Lung contusion	2	1	Type A

 doi:10.20944/preprints202412.1982.v1

1.2. Research Methods

1.2.1. Data Collection

As nurses at a Grade-A hospital in Yunnan Province, the researchers took part in gathering data on patients who had mini-midline catheters. The methods of observation and interview were used to gather the data. Three primary phases comprised the observation process: selected observation, descriptive observation, and focal observation. In this study, the degree of pain, psychological state, psychological experience of an unsuccessful catheterization, and complications following catheterization were observed by focal observation during and after catheterization. Knowledge and acceptance of the mini-midline catheter were also observed descriptively before and after catheterization.

Selective observation is carried out when no new concepts emerge, and representative patients who can accurately reflect the experience of catheter placement and tube insertion are chosen for observation. This is done in accordance with the saturation degree of the data, which indicates that all of the subject concepts in the data collected for this study are saturated.

1.2.2. Data Arrangement and Analysis

According to the observation and interview contents of the day, the field notes were made in detail, which were converted into clear and orderly text contents, and the shortage of field research data were sorted and perfected, thus the theoretical construction was achieved. Text material adopts three-level coding: Open coding, spindle coding, selective coding [7].

1.2.3. Quality Control

Since patient consent was acquired before the study began, mobile phone audio, video, and photo recording were used to capture and collect patient data in real time during the observation and interview study. To guarantee data collection accuracy, the obtained field data will then be sent to the patient for confirmation. Researchers gathered information from 15 individuals who had mini-midline catheterization. A non-structured interview is used, which promises to keep the interview content of the research object confidential, encourages the caregiver to fully talk about the inner feelings, and refrains from communicating with the patient to influence the interview results. The researcher himself participates in the department nursing work, builds a strong foundation for the in-depth interview, and builds a good mutual trust nurse-patient relationship with the patient.

2. Results

2.1. General Information of Interviewees

Heart valve replacement, spontaneous pneumothorax, lung cancer, rib fracture, esophageal hiatus hernia, aortic dissection, rib fracture, spontaneous pneumothorax, lung cancer, removal of internal fixation from the chicken chest, lung contusion, and mediastinal tumor were the diagnostic findings for 15 patients (P1 to P15). Every patient had a venipuncture, and type A and type C catheters were used mostly. Both structured and non-structured approaches were used in the study to assess pain, and the numerical scoring method (NRS) was used to assign scores. Table 1 displays the findings.

2.2. Interview Results

2.2.1. Knowledge of Mini Midline Catheter Products by Patients

(1) Lack of product knowledge of mini midline ducts Mini midline catheters have been used gradually in clinical nursing as a new type of infusion in recent years, but most patients do not understand them. In this interview study, 10 patients (66.67%) did not know the material, puncture site, puncture method, and indwelling time of the mini-midline catheter.

 doi:10.20944/preprints202412.1982.v1

The patient will surely have concerns about the mini-midline catheter and have a negative catheterization and tubing experience, even though the operator will thoroughly explain the pertinent contents of the device prior to catheterization. This is because of the mini-midline catheter's extensive professional span and strong professional characteristics. Patients are worried about the following:

P2: "I've never seen anything like this. I'll get stuck with this needle since it's so long."

P3 : "Will this needle stay in my veins?"

P8: "What kind of material is this pipe?" P12: "How long will this tube be in my veins?" Avoid breaking it.

(2) Impact of Mini Midline Catheter on Patients' Everyday Lives

A micro midline catheter with dimensions of 8 to 10 cm and product specifications of 3F and 4F was utilized in the study. It was produced by Anderson Medical Company. Eight patients had an impact on their daily lives, and even though the mini-midline catheter was significantly shorter than the midline catheter (15 cm to 30 cm) and the transperipheral central venous catheter (55 cm to 65 cm), it was still required to indwell the patient's forearm or upper arm for one to four weeks.

Here are a few replies from patients:

P 1: "I do not dare to move my arm, afraid of the tube coming out and suffering a needle."

P4: "When I'm putting on clothes, I need assistance. I'm constantly worried about damaging the pipe. That is problematic.

P 8: "This side of my arm dare not move, causing my shoulder now very painful."

(3) Inadequate patient support for diagnosing and managing mini-midline catheter problems

Miniature midline catheters are a new industry and technology that emerged from the development of midline catheters for clinical usage. Common infusion complications that patients are usually unaware of include venous thrombosis, phlebitis, vascular catheter-related infection, catheter occlusion, prolapse and displacement, and unplanned extubation rate because of small midline catheters. [8] Therefore, concerns regarding possible mini-midline catheter issues were expressed by all 14 patients who took part in the interview.

The interviewers' concerns are as follows:

P3: "The blood in the tube is in my blood vessel again, I won't develop cerebral thrombosis"; P4: "Will this lengthy tube in my body induce infection?' P1: "There's so much blood in the tube, it seems scary." How can I know in advance?

P12: "Unintentionally, my tube scraped, pulled out, and spilled a lot of blood"; P15: "My blood vessels are swollen and red." I have no idea what's wrong.

2.2.2. Fears of Patients with mini-Midline Catheters and Tubes

Fear of the operating room with the insertion of mini-centerline catheters

Because mini-centerline catheters and tubing are intrusive, they must be kept extremely sterile. Laying aseptic towels, hole towels, etc. is required to provide the biggest aseptic surface. When using a C-type mini-midline catheter, the operator must choose blood vessels using ultrasound technology and wear a single, sterile surgical gown. The patient is under a lot of psychological strain during catheterization, and there are numerous procedures to prepare for the operation. Thirteen (86.67%) catheters are afraid.

Some patients have stated the following fears:

P 5: "The nurse laid several layers on me and I felt like I was going to have surgery."

P 9: "I had never had so much to take with me before, and the scope of disinfection was so large that the nurse almost disinfected my entire arm, and I trembled a little."

(2) Fear of mini-centerline catheter insertion needle

 doi:10.20944/preprints202412.1982.v1

The patient is fully conscious and able to observe the entire procedure when the mini-midline catheter is pierced. Additionally, the length of the puncture needle is greater than that of the patient's peripheral indwelling needle and standard steel needle, which causes anxiety.

When the nurse removed the needle cannula, the study noted and captured the patient's terrified look on camera.

P7: "The nurse inserted that long needle into my skin.

P 14: "shot the picture, let me associate TV drama Rong Mammy with the needle Ziwei scene, scary."

2.2.3. Success Rate of Mini-Midline Catheter Puncture

Operators must complete specific training courses and a thorough assessment for mini-midline catheters prior to catheterization. The therapeutic use of mini-midline catheters is still in its early stages of investigation, particularly because the C-type catheter requires ultrasound guidance during puncture. While using puncture technology, nursing staff must acquire ultrasonography knowledge, and puncture success rates must be further increased.

With a 20% failure rate, three out of the 15 patients who were questioned experienced puncture failure.

P10: "I needed a second puncture because my first one didn't work out"; P11: "The nurse took the probe and found it on my arm." Permit me to occasionally reposition my arm. It had been a while.

2.2.4. Economic Pressure of Patients Undergoing Mini-Midline Catheterization and Catheterization

The manufacturer and brand of micro midline conduit vary greatly, as does the cost of the conduit. At the moment, the mini-midline catheter costs an average of RMB 200, and the indwelling needle that surrounds it costs roughly RMB 20. According to a few of the patients surveyed, there would be financial pressure to implant the mini-midline catheter. The patient's answers are as follows:

P9: "This thing is too expensive to bear for a long time."

3. Discussion

3.1. Prior to Catheterization, Improve Patient-Provider Communication and Health Education

The patient and their family will experience some anxiety and panic due to the invasive nature of the mini-midline catheter procedure. Medical and nursing staff should focus on communication prior to catheter placement in order to enhance the patient experience and reduce anxiety. The operator should also determine the patients' level of knowledge demand prior to catheter placement.

In order to encourage patients to ask questions and provide individualized propaganda and education, animated images, pictures, videos, and other vivid propaganda and education methods will be used, guided by the knowledge demand, to help patients understand the purpose, advantages, catheter materials, costs, puncture techniques, preparation before catheter placement, etc. [9]. According to recent research, passive music therapy or psychological counseling prior to catheterization can help patients feel less stressed and anxious and increase their satisfaction with the procedure [10].

Create a health education assessment form to educate patients on emergency care, identifying complications, and routine catheter maintenance. Keep an eye on how patients' self-efficacy and self-management skills are improving, as these can significantly enhance their physical and mental health as well as their quality of life.

3.2. Improve Mini Midline Catheter Resting Nurses' Professional Development

Rigorous training for mini-midline catheter resting nurses, as well as frequent theory and skill evaluations. When a mini-midline catheter nursing team is established, its members can read reports, study, share experiences, and continuously hone their operational skills, which will increase the puncture success rate [11]. In addition, create extubation records and become proficient in the evaluation, catheterization, and pre-catheterization regular maintenance procedures for the micro

 doi:10.20944/preprints202412.1982.v1

midline catheter. Clinical patients range widely in age, and their conditions are complex and subject to change. For instance, slow blood flow, skin laxity, poor vascular elasticity, and subcutaneous fat decrease in the elderly, all of which make catheterization challenging.

Multiple trauma and injury sites are numerous, complex, and frequently accompanied by shock. Two of the 15 catheterization patients in this study were successful with non-disposable punctures, and five of them employed the C-type mini-midline catheter. The analysis is necessary because the C-type catheter must use B-ultrasound to choose the puncture vessel, which is extremely difficult for nursing staff who lack ultrasonic understanding. To increase the success rate of mini-catheter punctures, it is essential to continuously experiment and gain expertise.

China's "Operation Specification of Intravenous Treatment Nursing Technology," which mandates that clinical nurses continuously learn new vascular access nursing decisions for catheterization patients, continuously explore the operation specification of mini-midline catheters, and continuously acquire new business and knowledge in clinical operation practice, does not regulate the pertinent contents of mini-midline catheters.

3.3. Strictly Standardize the Tube Implantation Process and Improve the Monitoring and Management of Difficulties

During catheterization, the nursing staff must adhere to aseptic procedures and choose the appropriate catheter type to satisfy the standard [9] of a 0.41 catheter vessel space ratio. Prior to catheter installation, the patient's age, vascular problems, infusion type and length, and viewpoint regarding the location of the catheter were all thoroughly assessed.

Master the treatment of phlebitis by properly flushing the catheter and assessing the infusion system both before and after infusion; The experiment demonstrates that the minimum sealing liquid is roughly twice the pipe's capacity plus the capacity of the additional device to prevent the pipe from clogging, demonstrating the mastery of the contraindication of compatibility, strictly impulsive positive pressure sealing pipe, and sufficient sealing liquid; Teach the patient to fix the external catheter with a U-shape, minimize excessive movement of the catheter's upper leg, and use the high-lift platform method for secondary fixation to keep the catheter from coming out;

Strict operating procedures must be followed during use, and in order to prevent infection, the film must be changed promptly when blood or liquid is leaking, and the transparent application must be changed at least seven days after there is no more leaking.

3.4. Strengthen the Legislation Promoting Health Insurance

A new intravenous infusion route has been made possible by the development of mini-midline catheter technology, which increases the number of alternatives available to patients requiring short-term and medium-term infusions but also places some financial strain on the system. To lessen patients' financial strain and give them solid financial support, it is anticipated that each province will progressively enhance its medical insurance supporting policies, expand its benefit-to-people policy, raise the percentage of reimbursement, and lessen personal burden.

Conclusion No. 4

According to the US Standard of Practice for Infusion Treatment, if the medication is antibacterial, rehydrating, and analgesic, the peripheral venous midline catheter [11] should be chosen for infusion for a period of one to four weeks. The micro midline catheter is presently in the experimental stage of clinical use, similar to the development of the peripheral venous catheter, and its naming is still inconsistent across domestic and international investigations [12]. The volume of blood lost, the duration of the procedure, the expense of placing a catheter, and the frequency of different problems are all still unknown.

In order to guarantee patient safety, it will be necessary to enhance clinical nursing staff's observation, prediction, and coping skills regarding mini midline catheter complications, as well as to reinforce training on the theory and skills of catheter placement and maintenance. The quantity of research samples and the skill of data extraction and summary in experimental procedures needed

 doi:10.20944/preprints202412.1982.v1

to be further enhanced, even if this study indicated that caregivers' ignorance of health education caused anxiety and issues.

Therefore, in order to give patients a better experience with the catheter and the tube, future research must improve the experimental content, strengthen data collection and research on the experience data and complication rate of mini-midline catheter patients, and better provide the foundation for nursing staff to use the mini-midline catheter.

References

1 Yan Ping, Zhang Beilei, and Huang Jinxia.Usefulness of Cluster Nursing in Midline Catheter-Assisted Interventional Treatment of Cerebrovascular Disorders [J].2021, 6:153-155; Clinical Medical Research and Practice.202126051. https://doi.org/10.19347/j.cnki.2096-1413.

2 Zhang Xiaowei, Zhao Xin, Li Qian, and others.Adult venous catheter-related bloodstream infection incidence: a meta-analysis [J].Nurse Recreation Journal, 2022, 37:1720–1727.J.cnki.hsjx.2022.18.020 DOI:10.16821

3 Pacilli M, Nataraja RM, and Qin KR. Should We Clear Up the Myths Around Long Peripheral Catheters? [J]. 20(5), J Vasc Access, 2019: 457-460.10.1177/1129729818819730 is the DOI.

4 Sellasie KW, Chiaretti A, Paladini A, et al. A pilot study on the ultrasound-guided implantation of long peripheral cannulas in children older than 10 years admitted to the emergency room [J]. e000244 in BMJ Paediatr Open, 2018 2(1).10.1136/bmjpo-2017-000244 is published.

5 Shaw I, Fretz R, and Enerson R. Field note-taking [M].Shanghai Translation Publishing House, 2012: 201-237; Fu Yu, He Min.

6 Li JB, Hu XY, Zhu D, et al.Electrochemical machining with gas film insulation: flow field studies J. 267: 247-256 in J Mater Process Technol, 2019.

7 Chen XM. Social science qualitative research［M］. Beijing: Publishing House for Educational Science

8 Baijian, Guo Yan, Mo Yongzhen, et al.. Impact of varying medium-length catheter tip placements on older patients [J].36:1300–1303 in Practical Geriatrics, 2022.

9 Hu Hua, Wan Yonghui, Yu Ying, et al.. Mini Midline Catheter: Research Status and Prospects [J].Journal of Nursing, 29:47–51, 2022.10.16460/j.issn1008-9969.2022.05.047 is the source.

10 The Best Evidence for Preventing Midline Conduit Occlusion in Adults [J] Liu Weihua, Bai Wenhui, Du Xiaoning, et al.Journal of Nursing, 29:46–51, 2022.10.16460/j.issn1008-9969.2022.22.046 is the source.Yuanyuan Zhang.causes of problems and the midline catheter's overall nursing utility for transfusion in neurosurgery [J].2555–2557 in Jilin Medical, 2022, 43.

11 Meta-Integration of Psychological Study of Fear in Patients with PICC Catheterization [J] Shao Jie, Xiong Yu, Ma Dan, et al.Nursing Journal, 2022, 37:80-82+86.

12 Qin K R, Nataraja RM, Pittiruti M, et al. Findings from a Survey of Vascular Access Specialists on Long Peripheral and Midline Catheters [J]. 2020, 1129729820966226; J Vasc Access.10.1177/1129729820966226 (DOI)