Research Article

BIOMEDICAL Journal of Scientific & Technical Research

ISSN: 2574 -1241

DOI: 10.26717/BJSTR.2026.67.010487

Advancing Safe Portacath Access: The Role of Hands-On Scientific Workshops in Clinical Skill Development

Dr. Hira khan Afridi, Dr. Aiman Majid*, Dr. Falak Shahab and Dr. Navaira Ali

Liaquat National Hospital, Pakistan

***Corresponding author:** Aiman Majid, Liaquat National Hospital, Pakistan

ARTICLE INFO

Received: November 16, 2026

Published: November 24, 2026

Citation: Dr. Hira khan Afridi, Dr. Aiman Majid, Dr. Falak Shahab and Dr. Navaira Ali. Advancing Safe Portacath Access: The Role of Hands-On Scientific Workshops in Clinical Skill Development". Biomed J Sci & Tech Res 67(3)-2026. BJSTR. MS.ID.010487.

ABSTRACT

Background: Port-a-Caths are crucial for long-term intravenous therapies, yet many healthcare professionals lack formal training in their access and care, raising complication risks.

Objective: This study assesses a scientific workshop's effect on knowledge of safe Port-a-Cath access techniques, evaluating baseline levels, immediate gains, retention, and participation correlation.

Methods: A non-randomized comparative study at Liaquat National Hospital involved 22 oncology and nursing professionals. Same-day pre- and post-workshop assessments measured knowledge on indications, insertion, maintenance, and complications. Completed within 3 months, the workshop featured lectures, demonstrations, and hands-on simulations. IBM SPSS version 27 was used. Normality was assessed using the Shapiro-Wilk test. Wilcoxon signed-rank test was applied for comparison of pre-post workshop scores. Statistical significance was considered at $p<0.05$.

Results: Healthcare professionals (mean age 34.6±6.4 years), with no prior Port-a-Cath training participanted in the study. The overall knowledge score increased significantly from 12(IQR 3) pre-workshop to 20(IQR 3) post-workshop ($p<0.001$). Significant improvements were observed across all assessed domains, including understanding of Port-a-Cath procedures, indications, techniques, complications and maintenance. ($p<0.001$). Correct responses improved across most individual knowledge items, with notable gains in recognition of complications and device types. Overall, 72.7% of participants rated the workshop as excellent.

Conclusion: The workshop markedly boosted theoretical and practical Port-a-Cath knowledge. Hands-on training is essential for enhancing competence, minimizing complications, and improving patient safety. These findings support the incorporation of structured training programs into routine clinical practice for sustained skill development.

Keywords: Central Venous Catheters; Vascular Access Devices; Nursing Education; Simulation Training; Patient Safety.

Introduction

In the era of recent medical science has necessitated the routine use of central venous access devices in the management of patients requiring long-term intravenous therapies, predominantly Port-a-Caths, These devices provides reliable and sustained long term venous access, which is essential for various uses like administration of chemotherapy, parenteral nutrition, and other intensive treatments. Nevertheless, the point should be keep in mind here is their safe and effective use, which requires a high level of clinical expertise to prevent potentially serious complications, including infections, thrombosis, and device malfunction.[1] Now a day, the widespread utilization of Port-a-Caths many healthcare professionals receive limited structured training on their proper access, maintenance, and associated risk management. This gap underscores the importance of targeted educational interventions designed to enhance both theoretical understanding and practical competence.[2] This study aims to evaluate the impact of a dedicated scientific workshop focused on the safe and effective techniques for Port-a-Cath access. By employing a structured pre- and post-assessment approach, the research seeks to measure the extent of knowledge acquisition among participating healthcare professionals. The outcomes of this investigation are expected to provide valuable insights into the

efficacy of such educational programs and support their broader integration into clinical training curricula to promote patient safety and improved healthcare delivery.[3] Port-a-Cath devices are essential for long term venous access in oncology patients; however, their safe handling requires adequate knowledge and procedural competence among health care professionals.

Evidence indicates that structured educational and simulation-based interventions significantly improve knowledge and clinical performance in Port-a-Cath care, emphasizing the importance of targeted training programs. In Pakistan, existing studies have reported persistent gaps in knowledge and clinical competency among health care professionals regarding vascular access devices care, reflecting limited structured training opportunities in routine practice. [4-5] Despite this, there is a paucity of evidence evaluating simulation- based, workshop-driven interventions specifically targeting Port-a-Cath access and maintenanace with immediate pre-post evaluation in local contexts. The novality of this study lies in its quasiexperimental design assessing both perceived and objective knowledge improvements following a structured, hands on workshop among multidisciplinary healthcare professionals, thereby providing locally relevant evidence to strengthen competency -based oncology training.

Material and Methods

This study employed a quasi-experimental, single group pre-test/ post-test interventional design to evaluate the effectiveness of a structured educational workshop on Port a Cath access and de-access technique. The study was conducted among healthcare professionals attending a scientific workshop. The duration of the study was three months, which included data collection, data entry, analysis and manuscript preparation. Participants comprised health care professionals from oncology, nursing and related clinical; specialties. A Port-a-Cath is an implantable venous access device used for lomg term intermittent intravenous therapy, providing reliable central venous access and minimizing repeates peripheral venipuncture. The workshop incorporated structured lectures, clinical demonstrations, and hand on training sessions focusing on device handling, proper access and de-access techniques, complication recognintion and evidence based management strategies. A standardized structured questionnaire consisting of 27 items was used for assessment. Qusetions 1-5 evaluated perceived knowledge using a 5 point Likert scale, questions 6-24 were best choice questions scored as correct (1) or incorrect (0), and questions 25-27 were open ended. Pre workshop assessement was conducted electronically via Google Forms after obtaining informed consent while the post workshop assessment used an indentical questionnaire in hardcopy form to ensure direct comparability. All data were anonymized prior to maintain confidentiality and were used solely purposes. Data were entered and analyzed using IBM SPSS Statistics version 27. Quantitative variables were assessed for normality and expressed as median with inter quartile range (IQR) due to non normal distribution, while categorical variables were presented as frequencies and percentages. The wilcoxon signed rank test was applied for comparison of pre and post workshop responses, and overall knowledge scores.

Results

A total of 22 healthcare professionals participants in this study. The mean age was 34.64±6.37 years, with a median age of 34 years with 9 interquartile range. The majority of the participants were females 14 (63.6%). The contribution of professional designation were followed as, 7(31.8%) were resident nurses, 7(31.8%) were BSN qualified staff, 2(9.1%) oncology doctors, 1(4.5%) consultant and 5(22.7%) other healthcare professionals. We observed 9(40.9%) participants had 1-5 years of expereience, 7(31.8%) had 6-10 years, 2(9.1%) had 11-15 years, 1(4.5%) had 16-20 years, and 3(13.6%) had more than 20 years of experience. Only 1(4.5%) participant had prior training on Port-a-Cath procedures, whereas 21(95.5%) had no previous exposure. The effectiveness of workshop was rated as, 16 (72.7%) excellent, followed by 4(18.2%) very good and 2(9.1%) good. Table 1 shows the demographic details of the participants and their response to the effectiveness of Port-a-Cath training workshop (Tables 2-4).

Table 1: shows Participants characteristics and perceived effectiveness of Port-a-Cath training workshop.

	n(%)
Age in years (Mean±SD); Median(IQR)	34.64±6.37; 34(9)
Gender	
Male	8(36.4)
Female	14(63.6)
Position	
Consultant	1(4.5)
Resident oncology	2(9.1)
Resident Nurse	7(31.8)
BSN	7(31.8)
Others	5(22.7)
Year of experience	
1-5 years	9(40.9)
6-10 years	7(31.8)
11-15 years	2(9.1)
16-20 years	1(4.5)
>20 years	3(13.6)
Previous training on Port-a-Cath procedures	
Yes	1(4.5)
No	21(95.5)
Participant response on the effectivness of symposium in enhancing their understanding of Port-a-Cath procedures	
Excellent	16(72.7)
Very Good	4(18.2)
Good	2(9.1)

Table 2: shows the comparison of pre and post responses of likert questions

Questions	Pre workshop	Post workshop	P-value
What is your Understanding about a Port-a-Cath?	4(1)	5(1)	<0.001*
Do you know about the Indications of Port-a-Cath insertion?	4(1)	5(0)	<0.001*
Do you know the Insertion techniques of Port-a-Cath?	3(2)	5(1)	<0.001*
Do you know about Potential complications associated with Port-a-Cath?	3(2)	5(1)	<0.001*
Do you know the Maintenance and care of Port-a-Cath?	3(2)	5(1)	<0.001*
Wilcoxon signed rank test was applied			
*Statistically significant at p<0.05			
Result values are presented as Median(IQR)			

Note: Table 02 shows the pre and post workshop comparison of preceived knowledge using Likert scale items (i.e. Questions 1 -5) which demonstrated a statistically significant improvement across all domains (p<0.001).

Table 3: shows overall pre and post comparison of correct responses

S.No	Questions	Correct Responses	
		Pre workshop	Post workshop
1	What is the primary purpose of long-term venous access devices?	21(95.5)	22(100)
2	Which of the following is a common type of long-term venous access device use for chemotherapy?	20(90.9)	21(95.5)
3	What is one of the main advantages of using a Port-a-Cath for long-term venous access?	22(100)	20(90.9)
4	Which patient population is most likely to benefit from long-term venous access devices?	22(100)	22(100)
5	What is a potential complication associated with long-term venous access devices?	18(81.8)	21(95.5)
6	Which of the following is NOT a common indication for long-term venous access?	17(77.3)	19(86.4)
7	What is the recommended method for cleaning the access port before use?	20(90.9)	21(95.5)
8	Which factor is most important when selecting a site for long-term venous access?	19(86.4)	17(77.3)
9	What is a portacath?	15(68.2)	16(72.7)
10	How often should a Port-a-Cath be accessed for maintenance?	13(59.1)	13(59.1)
11	Which of the following NOT an indication of portacath?	14(63.6)	17(77.3)
12	Occlusion of catheter can be due to?	12(54.5)	17(77.3)
13	Portacath is inserted into	16(72.7)	20(90.9)
14	Which of them is an early complication of portacath?	4(18.2)	8(36.4)
15	Late complications usually occur after?	6(27.3)	19(86.4)
16	What is use to flush portacath?	18(81.8)	21(95.5)
17	How many types of portacath?	9(40.9)	20(90.9)
18	What is lifespan of a portacath?	7(31.8)	5(22.7)
19	What are the common complications associated with Port-a-Cath insertion?	22(100)	9(40.9)

Note: In Table-03 ,the analysis of knowledge question i.e. question 6-24 were assessed through best choice questions. The notable improvements were observed in knowledge of late complications (6(27.3%) vs 19(86.4%)), types of Port a Cath 9(40.9%) vs 20(90.9%)), causes of catheter occlusion (12(54.5%) vs 17(77.3%)), and insertion site (16(72.7%) vs 20(90.9%)). We found overall increase in correct responses following the workshop.

Table 4: Shows overall pre and post comparison of knowledge score

	Median (IQR)	P-value
Pre Score	12(3)	<0.001*
Post Score	20(3)	
Wilcoxon signed rank test was applied		
*Statistically significant at p<0.05		

Note: The over all knowledge score, calculated from the sum of corrected responses (question 6-24), demonstrated a statistically significant increase following the workshop (p<0.001). The pre median score of workshop was 12(3) and the post score was 20(3). Table-04 reflects as substantial improvement in knowledge after the educational session.

Discussion

This study conducted to evaluate the theoretical and practical knowledge of healthcare professional regarding Port a cath as well as to evaluate effectiveness of a structured workshop on Port-a-Cath access, care, and complications among healthcare professionals at Liaquat National Hospital, Karachi. The findings demonstrate a significant improvement in participants' knowledge and understanding across all domains assessed, as shown by the statistically significant increase in both subjective and objective scores post-intervention. With advances in medicine and technology, many devices-especially implantable Port-a-Caths-have been widely used for the treatment of oncology patients worldwide. These devices provide ease of access as well as enhanced patient comfort by minimizing multiple needle pricks. The oncology healthcare team relies heavily on nurses as their backbone, making it imperative that new developments in practice are acquired by nursing staff. It is crucial that the oncology healthcare team, especially nurses, be educated about new advances, as training programs have been shown to impart more knowledge and skills than other teaching methods. [6-7] Although we had Resident Nurses and Bachelor's prepared nurses, the majority of participants (95%) had not received any formal training on Port-a-Cath management prior to the workshop, highlighting a substantial educational gap. This finding is consistent with previous literature, which reports limited formal training among nurses and physicians regarding central venous access devices despite their widespread use in oncology and chronic disease management settings. [8-10] This gap suggests an opportunity for future curriculum design in nursing education to include comprehensive training on these devices, thereby improving understanding and practice.

The baseline mean scores for knowledge of Port-a-Cath indications, insertion techniques, complications, and maintenance were modest, reflecting this lack of prior exposure [8-10]. The workshop led to marked improvements in all assessed areas. For example, the mean score for understanding Port-a-Cath indications increased from 3.41 to 4.73, and for awareness of complications from 3.00 to 4.45, both with p-values < 0.001. The overall mean knowledge score rose from 12.40 to 19.63, and BCQ scores improved from a mean of 12 to 19, reflecting both subjective and objective gains. These results are in line with findings from Nguyen et al., who reported significant increases in Port-a-Cath knowledge among nurses following a targeted educational intervention [11]. Similarly, studies have shown that hands-on workshops and simulation-based training are effective in improving healthcare providers' competence and confidence in managing central venous access devices. The impact of an advanced educational module designed for hemodialysis nurses and technicians, focusing on physical examination skills to identify vascular access at risk for malfunction, was significant. The study demonstrated a notable improvement in knowledge scores post-training, although changes in practical skill assessments were less pronounced. These findings highlight a critical gap between vascular access knowledge and clinical physical assessment skills, emphasizing the need for enhanced, hands-on training approaches to improve patient outcomes and device longevity through timely recognition and management of complications such as infection, thrombosis, and mechanical failure [12].

The overwhelmingly positive feedback regarding the workshop's effectiveness (with 72% rating it as excellent) suggests high participant satisfaction and perceived value. However, the low response rate to open-ended questions (81% unanswered) indicates a potential area for improvement in future educational interventions, possibly by fostering a more interactive or reflective environment. [13-14] Overall, the results underscore the importance of structured, practical training in Port-a-Cath management for multidisciplinary teams. Given the increasing reliance on long-term venous access devices in oncology and other specialties, ongoing education and competency assessment should be prioritized to ensure optimal patient outcomes and minimize complications. 14 Future studies could explore the long-term retention of knowledge and its impact on clinical practice and patient care. Topics regarding Long-term venous access devices and care should be incorporated in Nursing Curriculum. In addition, Continued Medical Education should be arranged for healthcare professionals to refresh the knowledge as well. [15-16]

Conclusion

Hands on workshops significantly improve both theoretical and practical knowledge of Port-a-Cath access among healthcare professionals. Such training enhances procedural competence, builds confidence and helps mininmize complications, particularly in high risk patients undergoing chemotherapy. As Port-a-Caths are critical for long-term intravenous therapy and require technical expertise for safe access, these findings underscore the importance of structured , skill-based training. Incorporating targeted workshops into routine clinical practices supports continuous professional development, strengthens patients safety and optimizes overall healthcare outcomes.

Limitations

This study has several limitations that should be acknowledged. First, the small sample size and single center design may limit the generalizibility of the findings. Knowledge assessment was conducted immediately after the workshop, and therefore the long-term retention of knowledge and skills could not be evaluated. Additionally, the study primarily assessed knowledge outcomes rather than direct observation of clinical performance or patient-related outcomes, which may not fully reflect real-world competency. Future studies with larger, multicenter samples, randomized designs, longer follow-up periods, and objective assessment of clinical skills are recommended to better evaluate the sustained impact of structured Port-a-Cath training programs.

Declarations

Ethical approval and Consent to Participate:

This study was conducted in accordance with the ethical standards of the institutional research committee of Liaquat National Hospital and Medical College and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all participants prior to their inclusion in the study. All data were anonymized to ensure confidentiality.

Consent for Publication

All healthcare professionals who participated in this study provided written informed consent for their anonymized data to be included in this publication. No identifying information of participants is disclosed. Participation was voluntary, and all participants were informed about the purpose of the research and the intended publication of the results.

Funding

Not Applicable

References

1. Sugawara S, Sone M, Sakamoto N, Sofue K, Hishimoto K, et al (2023) Guidelines for central venous port placement and management (abridged translation of the japanese version). Interv Radiol 8(2): 105-117.
2. Elendu C, Amaechi DC, Okatta AU, Amaechi EC, Elendu TC, et al (2024) The impact of simulation-based training in medical education: A review. Medi (Baltimore) 103(27): e38813.
3. Shih SF, Hsu LL, Hsieh SI (2023) Effects of Digital Learning and Virtual Reality in Port-A Catheter Training Course for Oncology Nurses: A Mixed-Methods Study. Healthcare (Basel) 11(7): 1017.
4. Özden D, Alan N, Ayık C, Carga S, Gurol Arslan GU (2025) Effectiveness of scenario-based simulation training in urinary catheterization on nursing students' knowledge, skills, self-confidence and satisfaction: a randomized controlled study. Nurse Educ Pract 89: 104607.
5. Barsuk JH, McGaghie WC, Cohen ER, Balachandran JS, Wayne DB, et al (2009) Use of simulation-based mastery learning to improve the quality of central venous catheter placement in a medical intensive care unit. J Hosp Med 4(7): 397-403.
6. Pedersen JE, Eide H, Sandsleth MG, Taylor l, Forsund LH, et al (2025) Advanced practice nurses' roles and responsibilities in advance care planning for older persons – a mixed methods systematic review. J Adv Nurs 81(10): 6224-49.
7. Deshmukh M, Shinde M (2014) Impact of structured education on knowledge and practice regarding venous access device care among nurses. Int J Sci Res 3: 895-901.
8. das Graças Silva Matsubara M, De Domenico EB (2016) Virtual Learning Environment in Continuing Education for Nursing in Oncology: an Experimental Study. J Cancer Educ 31(4): 804-810.
9. Beck SL, Brant JM, Donohue R, Smith EM, Towsley GL, et al (2016) Oncology Nursing Certification: Relation to Nurses' Knowledge and Attitudes About Pain, Patient-Reported Pain Care Quality, and Pain Outcomes. Oncol Nurs Forum 43(1): 67-76.
10. Bakey SJ (2014) Evaluation of nurses' practices throughout hemodialysis treatment for patients in hemodialysis unit at Baghdad teaching hospitals. Kufa J Nurs Sci 2: 23-27.
11. Nguyen HT (2019) Improving the Knowledge of Port-A-Cath Care For Nurses. Master's Theses 120.
12. Peters V, Zerwes S, Kerndl H, Hyhlik-Durr A, Liebetrau D, et al (2025) Evaluation of the Learning Experience after Ultrasound-Guided Percutaneous Arteriovenous Fistula Placement Workshop Utilizing the Ellipsys Vascular Access System. Ann Vasc Surg 114: 144-53.
13. Sapri ND, Ng YT, Wu VX, Klainin-Yobas P (2022) Effectiveness of educational interventions on evidence-based practice for nurses in clinical settings: A systematic review and meta-analysis. Nurse Educ Today 111: 105295.
14. Chow D, Kippenberger T, Kobylarz F, Livezey J, Anklowitz A, et al. (2025) Simulation-based Central Venous Catheter Insertion Training Increases Comfort Amongst Residents. Vasc Specialist Int 41: 4.
15. Lommi M, Tolentino Diaz MY, Piredda M, Raffaele B, Ricci S, et al (2025) Nurses' Knowledge and Self-Efficacy in the Management of Vascular Access Devices Before and After Field Training Course: A Quasi-Experimental Study. Nurs Open 12(4): e70090.
16. Solera-Gómez S, Benedito-Monleón A, LLinares-Insa LI, Sancho-Cantus D, Navarro-Illana E, et al (2022) Educational Needs in Oncology Nursing: A Scoping Review. Healthcare (Basel) 10(12): 2494.

ISSN: 2574-1241

DOI: 10.26717/BJSTR.2026.67.010487

Aiman Majid . Biomed J Sci & Tech Res

This work is licensed under Creative *Commons* Attribution 4.0 License

Submission Link: https://biomedres.us/submit-manuscript.php



Assets of Publishing with us

- Global archiving of articles
- Immediate, unrestricted online access
- Rigorous Peer Review Process
- Authors Retain Copyrights
- Unique DOI for all articles

https://biomedres.us/