Vol. 2 No. 3 (2025)

ONLINE ISSN :3007-309X
PRINT ISSN :3007-3081

Journal of Medical & Health Sciences Review

EFFECT OF EDUCATIONALINTERVENTIONS ON ONCOLOGY NURSE KNOWLEDGE AND PRACTICE ABOUT THE CARE OF CHEMOTHERAPY PATIENTS WITH PORT-A- CATHETER

Iltaf Hussain[1], Kousar Perveen[2], Syeda Tasneem Kausar[3], Rubina Jabeen[4]

[1]MS Nursing Student, Department of Nursing, Superior University, Lahore,
Email: abroaltaf009@gmail.com

[2]Associate Professor, Superior University Department of Nursing, Lahore, Email: kous84@gmail.com

[3]Nursing Director, Superior University Department of Nursing, Lahore,

Email: Sindy070766@Gmail.com

[4]Principal, Superior University Department of Nursing, Lahore, Email: rubinajabeen302@yahoo.com

ARTICLE INFO:

Keywords:
Educational interventions, Oncology nurses, Nurse knowledge, Nurse practice, Chemotherapy patients, Central venous access

Corresponding Author:
Iltaf Hussain,
MS Nursing Student,
Department of Nursing,
Superior University, Lahore
abroaltaf009@gmail.com

Article History:
Published on 19 July 2025

ABSTRACT

Background: Cancer is a proliferative, invasive, and metastatic disease that is caused by an accumulation of genetic abnormalities that randomly produce a malignant cell. Chemotherapy is the most commonly prescribed cancer treatment modality, which utilizes chemical agents or drugs that destroy cancer cells in the cell cycle and inhibit the growth and spread of cancerous cells. It may be combined with surgery or radiation therapy, or both to reduce tumor size preoperatively and to destroy remaining tumor cell postoperatively. Oncology nurses play a pivotal role in caring of Port-A-Catheter, being responsible for maintaining access integrity, preventing its failure and reducing access related complications.

Objective: To assess the effect of Educational Interventions on Oncology Nurse Knowledge regarding the Care of Chemotherapy Patients with Port-A- Catheter.

Methods: A quasi-experimental study design was used. The study setting and adulation participants were taken from inpatient oncology department of NIMRA Cancer Hospital, LUMHS Jamshoro, and Karachi, Pakistan. Purposive sampling and time duration was 9 months. The calculated sample Size was less than 30. So 30 participants was taken after Adding 20% drop out rate the sample

size was 36. The both male and female have age between 23-45 with six month experience in chemotherapy were selected for this research.

Results: After the intervention, nurses showed a significant improvement in both knowledge and practices related to port-a-cath care. The average knowledge score increased markedly from pre-intervention (M = 0.3611, SD = 0.1381) to post-intervention (t = 15.687, $p < 0.001$). Similarly, practical skills improved significantly (M = 0.3968, SD = 0.1920; t = 12.401, $p < 0.001$). Post-test correct responses exceeded 70% on most items, with over 83.3% correctly identifying key aspects such as port placement, disinfectants, and complications. Clinical compliance with procedures like flushing, dressing, and documentation also rose above 75%. These findings confirm that the intervention had a statistically significant positive impact on nurses' competency in managing port-a-cath.

Conclusion: This study underscores the vital role of education in enhancing oncology nurses' knowledge and practices related to Port-A-Catheter care. Initially, significant knowledge gaps in infection control, complication management, and maintenance were identified. Following a structured educational program, nurses demonstrated marked improvement in both understanding and clinical application.

INTRODUCTION

Cancer is a proliferative, invasive, and metastatic disease that is caused by an accumulation of genetic abnormalities that randomly produce a malignant cell. Such abnormalities can be induced by chemical carcinogens, chronic inflammation, exposure to radiation, or by genetic predisposition (Mohammadi-Motlagh et al., 2023). It is a major worldwide public health problem and the second leading cause of death in the United States(Nairuz et al., 2023). According to the World Health Organization (WHO) 2020, the global cancer burden has been raised to 19.3 million new cases and 10.0 million deaths. In Pakistan according to Global Cancer Observatory (GCO) 2020, number of new cancer cases was134, 632, and the number of deaths due to cancer was 89, 042 (Cancer, 2020). Chemotherapy is the most commonly prescribed cancer treatment modality, which utilizes chemical agents or drugs that destroy cancer cells in the cell cycle and inhibit the growth and spread of cancerous cells. It may be combined with surgery or radiation therapy, or both to reduce tumor size preoperatively and to destroy remaining tumor cell postoperatively (Ehmann et al., 2023). Chemotherapy can be administered thought various routes; the most common utilized route is the intravenous (IV) administration. Modern chemotherapeutic management depends upon repeated and safe access to the venous system for the delivery of drugs, fluids and blood products (Manning-Geist et al., 2023). Hence, Peripheral veins are rapidly destroyed by repeated venipuncture and by long term chemotherapy; the long-term venous access devices (VADs) have helped to overcome this issue. The frequently employed type of venous access system is the Port-A-Catheter system (Xiaotong Qiu et al., 2023). Port -A- Catheter is a medical device that provides direct access to large blood vessels which consisting of a reservoir compartment (portal) and a catheter implanted into a surgically created pocket on the chest wall or upper arm. The “portal” is a chamber that is implanted subcutaneously and connected to the catheter with a special lock. Placement of the port-A- catheter might be done under local anesthesia in the

inpatient or outpatient setting; where patients are discharged within few hours. The port is utilized for chemotherapy after 12-24 hours of insertion. A port-A-catheter usually remains in place for an average two to six years (Karamanliev et al., 2023). Port catheters are preferred in oncology patients for the prevention of recurrent venous intervention, long lasting and conservation of daily living the septum of the port to access the reservoir. Placement of a port catheter might be done under local anesthesia and patients usually would be discharged within hours after operation. The implantable ports catheters are used to deliver chemotherapy to cancer patients (Xiaoxia Qiu et al., 2023). The main advantages of it are the protection of venous capital, the easier venous activities. It is a medical device consisting of a reservoir compartment (port) and a catheter implanted into a surgically created pocket on the chest wall or upper arm. A port can be implanted in an inpatient or outpatient setting or in a day surgery unit (Karamanliev et al., 2023). The port is fixed subcutaneously and the catheter connects the port to a central vein. A needle is inserted through access, lower risk of extravasation of chemotherapeutic agents and the capability to inject irritants agents that can cause, in other conditions, skin necrosis (Li & Shan, 2024). Other advantage of port -A- catheter is that the puncturing needle can be removed after each infusion and the skin covering the port reservoir aids as a natural protection against infection.

MATERIALS AND METHODS

A quasi-experimental study was conducted to evaluate the effect of educational interventions on oncology nurses' knowledge and practice regarding the care of chemotherapy patients with Port-A-Catheters. The study took place at the inpatient oncology department of NIMRA Cancer Hospital, LUMHS Jamshoro, and Karachi, Pakistan. Using purposive sampling, 36 registered nurses (both male and female, aged 23–45) were recruited, accounting for a 20% dropout rate from the initial sample size of 30. Eligible nurses had at least six months of inpatient oncology experience and were involved in chemotherapy patient care. Nurses on rotation, student nurses, head nurses, and those who had recent training on Port-A-Catheter care were excluded. Data were collected using three tools, including a self-developed questionnaire covering demographic details and a 31-item multiple-choice knowledge test. The test was divided into three subgroups: basic knowledge (8 questions), care procedures (19 questions), and complications (4 questions), with one point awarded for each correct answer. The study spanned 9 months following IR approval.

.

4.1. Demographic Analysis

Table

Constructs		Frequency	Percentage
Gender	Male	4	11.1
	Female	32	88.9
Job Type	Permanent	36	100.0
Marital Status	Married	13	36.1
	Single	23	63.9
Age Group	23-34 Years	14	38.9
	35-45 Years	22	61.1
Qualification	Nursing Diploma	19	52.8
	Specialty	9	25.0
	Masters	8	22.2
Job Position	Head Nurse	36	100.0
DHQ Location	NIMRA Department, Jamshoro	26	72.2
	Liaquat University of Medical & Health Sciences (LUMHS) Jamshoro	10	27.8
Department	Oncology	36	100
Experience	1-3 Years	9	25.0
	4-6 Years	8	22.2
	7-10 Years	9	25.0
	Above 10 Years	10	27.8

NURSES' PRACTICES REGARDING PORT-A-CATHETER

4.1.1. Practical steps before port site care

Sr. No.	Questions	Done		Not Done	
		Freq.	Percent	Freq.	Percent
1	Equipment's preparation	13	36.1	23	63.9
2	explain procedure	14	38.9	22	61.1
3	hand hygiene	15	41.7	21	58.3
4	palpate Porto	11	30.6	25	69.4
5	Standard precautions	13	36.1	23	63.9

4.1.2. Practical steps during port site care

Sr. No.	Questions	Done		Not Done	
		Freq.	Percent	Freq.	Percent
6	Flushing	15	41.7	21	58.3
7	Scrubbing the site	13	36.1	23	63.9
8	assessing blood return	11	30.6	25	69.4
9	Covering the site with dressing	15	41.7	21	58.3

4.1.3. Practical steps after port site care

Sr. No.	Questions	Done		Not Done	
		Freq.	Percent	Freq.	Percent
10	Labelling	13	36.1	23	63.9
11	Re access site and change dressing according policy	13	36.1	23	63.9
12	dispose equipment's	10	27.8	26	72.2
13	Documentation	12	33.3	24	66.7
14	hand hygiene	13	36.1	23	63.9

4.1.4. Practical steps before port site care

Sr. No.	Questions	Done		Not Done	
		Freq.	Percent	Freq.	Percent
1	Equipment's preparation	27	75.0	9	25.0
2	explain procedure	27	75.0	9	25.0
3	hand hygiene	25	69.4	11	30.6
4	palpate Porto	29	80.6	7	19.4
5	Standard precautions	27	75.0	9	25.0

4.1.5. Practical steps during port site care

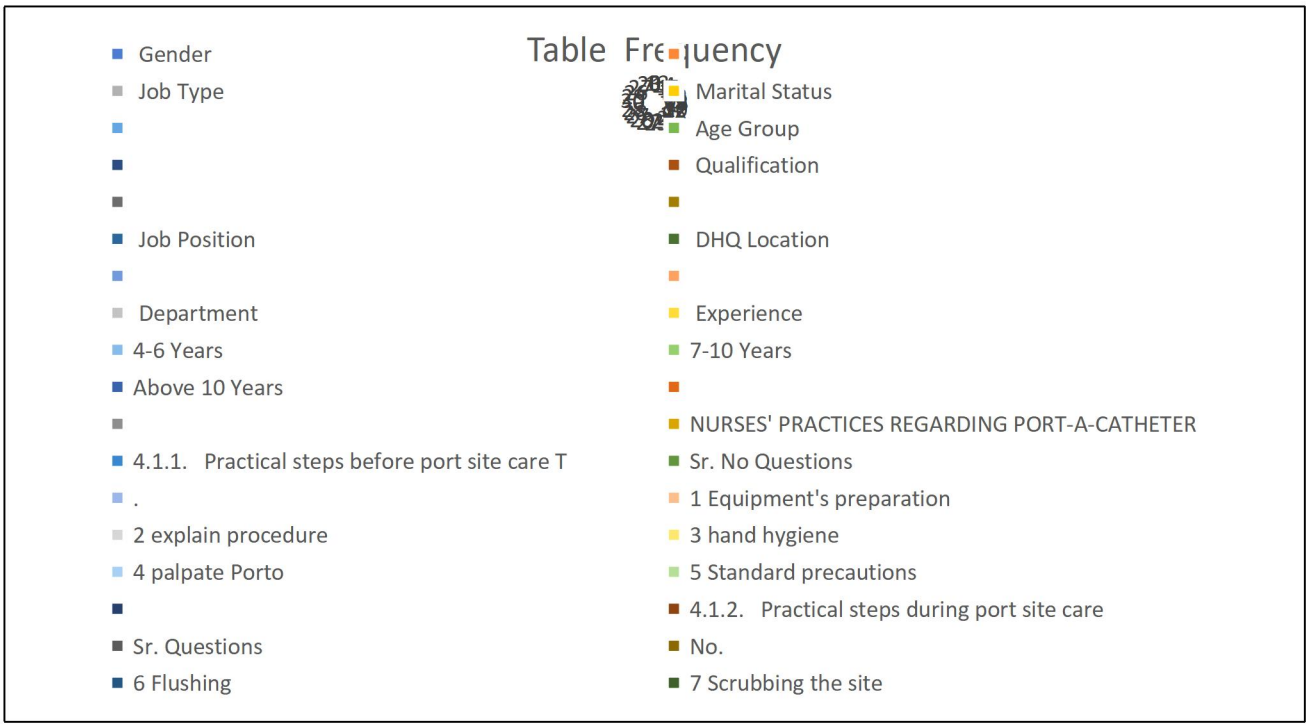
Table 4.12

Sr. No.	Questions	Done		Not Done	
		Freq.	Percent	Freq.	Percent
6	Flushing	28	77.8	8	22.2
7	Scrubbing the site	27	75.0	9	25.0
8	assessing blood return	28	77.8	8	22.2
9	Covering the site with dressing	28	77.8	8	22.2

4.1.6. Practical steps after port site care

Table 4.13

Sr. No.	Questions	Done		Not Done	
		Freq.	Percent	Freq.	Percent
10	Labelling	30	83.3	6	16.7
11	Re access site and change dressing according policy	29	80.6	7	19.4
12	dispose equipment's	26	72.2	10	27.8
13	Documentation	27	75.0	9	25.0
14	hand hygiene	23	63.9	13	36.1



RESULTS

This study aimed to assess the impact of an educational intervention on nurses' knowledge and practices regarding port-a-cath care. A total of 36 head nurses participated, with the majority being female (88.9%), single (63.9%), and aged between 35-45 years (61.1%). Most held a Nursing Diploma (52.8%) and had between 1 to 10 years of experience. Pre-intervention data revealed that nurses demonstrated limited knowledge in key areas of port-a-cath care. For instance, only 27.8% correctly identified the port-a-cath structure, and 41.7% recognized its types. Similarly, understanding of complications and contraindications was low, with correct response rates ranging from 33.3% to 44.4%. Post-intervention analysis showed a substantial improvement across all knowledge items. Correct responses increased significantly; for example, knowledge about the port-a-cath structure rose to 72.2%, and understanding of complications and correct care procedures improved to over 75% in most items. The average improvement in knowledge was statistically significant, as confirmed by the paired t-test result (Mean Difference = 0.36111, t = 15.687, p = .000), indicating a highly significant increase in knowledge post-intervention. Before the educational intervention, practical adherence to port-a-cath care protocols was suboptimal. Only 36.1% prepared equipment properly, and just 41.7% followed correct flushing procedures. Post-intervention results showed a dramatic improvement in all practical domains. For instance, flushing rose to 77.8%, equipment preparation to 75.0%, and dressing changes and documentation were completed correctly in over 75% of cases. A paired t-test comparing pre- and post-intervention practices yielded a statistically significant mean difference of 0.39683 (t = 12.401, p = .000), suggesting a notable enhancement in clinical practice following the training program.

DISCUSSION

Cancer is still one of the world's top causes of death and a serious public health issue, even in Pakistan and other nations. One of the main

treatments for cancer is chemotherapy, which is frequently administered via long-term venous access devices like the Port-A-Catheter. Although these devices provide frequent, safe access to the circulation, there are risks associated with their usage, such as the possibility of infections, thrombosis, or mechanical failure. In order to guarantee patient safety and treatment efficacy, oncology nurses are essential in the management and upkeep of these devices. However, research has indicated that a large number of nurses are not well-versed in the proper management of Port-A-Catheters, which might raise the risk of problems. Reduced hazards can only be achieved by appropriate training and adherence to evidence-based recommendations. Therefore, it is imperative to provide educational interventions to close this knowledge-practice gap and enhance the standard of nursing care provided to patients undergoing chemotherapy. Studies assessing the effects of such interventions on nurses' understanding and practices of Port- A-Catheter care are conspicuously lacking in Pakistan. By evaluating how well educational programs raise the abilities of oncology nurses, this study seeks to close that gap and improve patient outcomes and the standard of healthcare. The results from Tables 4.2 to 4.7 clearly show that many oncology nurses are struggling with essential knowledge and practical tasks involved in port-a-cath care. From basic understandinglike identifying port components and knowing how often to flush the line to more hands-on procedures such as checking for blood return or cleaning the site properly, nurses consistently scored below 50%. These aren't minor issues; they directly affect the safety and well-being of patients undergoing chemotherapy. When a nurse isn't confident about infection control procedures or fails to recognize early signs of complications like embolism or infection, it can lead to serious, even life-threatening, consequences for patients(Naidoo, 2022). This isn't just a local problem either studies from around the world echo these findings. For instance, Rostom, Ashour, and Abd El Razik (2009) found that nurses who received targeted training significantly improved in both knowledge and practice related to port-a-cath care. Another study showed that using simulation and virtual reality tools helped nurses become more confident and skilled in managing central lines(Zhao, Geng, et al., 2024). Other researchers also also emphasized on how case-based and hands-on training helps nurses make better decisions and follow correct procedures more consistently(Sultana et al., 2024; Zhao, Ding, Meng, Lei, & Ma, 2024). All of this highlights one main point: nurses want to do their best for their patients, but they need the right training and support to do so. By offering regular, practical, and easy-to-access educational programs, hospitals and healthcare systems can help nurses feel more confident and competent. Patients who depend on port-a-caths for life-saving therapy will truly benefit from this, in addition to the fact that it will raise the standard of care. Everyone may agree that improved nursing education ultimately results in better patient outcomes. The assessment of nurses' knowledge and practice of port-a-cath care reveals a generally sound foundation, but it also identifies key areas for improvement. The majority of nurses had a thorough understanding of key components such as port-a-cath types, structure, standard venous placement, and conventional clinical indications. The accurate response rates in these categories ranged from 72.2% to 83.3%, indicating a reasonable baseline of knowledge. These findings are similar with recent studies(Kaur et al., 2023; Zhang et al., 2023), which shows that oncology nurses typically have a thorough awareness of central venous access devices since they routinely offer chemotherapy care. However, the findings highlighted certain knowledge gaps, notably in terms of early symptom detection, complication treatment, and contraindications.

For example, a sizable minority of nurses were unable to appropriately recognize indications of common complications like infection or embolism. This study supports the findings of Santos-Costa et al. (2022), who emphasized the difficulty nurses have when transforming theoretical understanding into timely clinical decision-making, particularly in high-risk circumstances. On the practical side, the results were mainly good, with most nurses adhering to important protocols such as site evaluation, sterile dressing application, and equipment setup. However, there were serious variations in key infection control measures, notably hand cleanliness, which was practiced by just 63.9% of respondents. This echoes worldwide concerns expressed that hand cleanliness, despite being a critical component of infection control, is commonly disregarded in clinical practice(Tartari et al., 2021). Furthermore, participants did not consistently follow simple but crucial steps such as cleaning the port, checking for blood return, and recording procedures. These breaches, while occasionally minor, can have major implications for patient safety. To overcome these shortcomings, (Boyd, Wilson, Elsenbroich, Heppenstall, & Meier, 2022) propose combining targeted, scenario-based instruction with clinical simulations, and the evidence is mounting in favor of this strategy. In conclusion, while nurses' overall competency in port-a-cath care appears to be robust, focused reinforcement particularly in complication identification and infection control is crucial for providing safe, consistent, and high-quality care to patients. The results of this study demonstrate that nurses' understanding of port-a-cath care improved as a result of the educational intervention. Following the training, participants' knowledge scores improved by an average of 0.36 points, and this gain was statistically significant. The minimal standard deviation (0.14) indicates that this development was constant throughout the sample, which is even more promising. This indicates that nearly every participant, not just a select few, gained something from the program. This is corroborated by the confidence interval, which indicates that the actual improvement occurs.These results clearly imply that the training was successful in increasing nurses' knowledge while also providing them with the clarity and confidence to use that information in practical settings. Previously the studies have also noted that the educational training substantially influence the nurses knowledge of port-a-cath care in the hospital setting(M Galal, G Mohamed, E Ghonem, & M El-Sayed, 2024). In the similar vein, Rady Sobh, Salama, R El-Refaay, and Ebrahim Elsherbiny (2023) found that targeted education significantly improved oncology nurses' understanding and handling of central lines like port-a-caths. Likewise, hands-on training led to better knowledge retention and safer nursing practices(Haqparast, Shahsavari, Zarei, Haqhani, & Manoukian). Similar to the current study, several research demonstrate the practical benefits of continuing education for nurses. Helping nurses feel more secure, make better clinical decisions, and ultimately give their patients safer care is more important than simply passing exams. The study's findings provide compelling evidence for the continuation and growth of such teaching programs in clinical settings.

Conclusion.

The educational intervention was highly effective in enhancing both the knowledge and practice of nurses regarding port-a-cath care. The significant p-values ($p < .001$) for both knowledge and practice indicate that the observed improvements are not due to chance. These findings support the implementation of regular educational programs to ensure safe and standardized port-a-cath management in clinical settings.

REFERENCES

1. Boyd, J., Wilson, R., Elsenbroich, C., Heppenstall, A., & Meier, P. (2022). Agent-based modelling of health inequalities following the complexity turn in public health: a systematic review.
2. *International Journal of Environmental Research and Public Health, 19*(24), 16807. Cancer, I. A. f. R. o. (2020). Global cancer observatory (GCO). *World Health Organisation- International Agency for Research on Cancer*.
3. Ehmann, S., Shay, K., Zhou, Q., Iasonos, A., Sonoda, Y., Gardner, G. J., Roche, K. L., Zammarrelli III, W. A.,
4. Yeoushoua, E., & O'CeaR. E. (2023). Outcomes and long-term follow-up by treatment type for patients with advanced-stage ovarian cancer managed at a tertiary cancer center: A Memorial Sloan Kettering Cancer Center Team Ovary study. *Gynecologic oncology*, *169*, 118-124.
5. Karamanliev, M., Yotsov, T., & Dimitrov, D. (2023). Success rate and safety of totally implantable access ports placed by the cephalic vein cutdown technique in oncological patients–a single-center study. *Folia Medica*, *65*(4), 577-581.
6. Kaur, H., Kaur, S., Singh, A., Grover, U., Maheshwari, C., & Chawla, S. S. (2023). Simulation-based training in central venous catheterization for first-year postgraduate students: A prospective study. *Current Medicine Research and Practice, 13*(5), 217-221.
7. Li, H., & Shan, J. (2024). Risk Factors of the Totally Implantable Venous Access Device- Related Infection in Patients With Brain Tumors Undergoing Chemotherapy After Surgery. *Surgical Infections*.
8. M Galal, Z., G Mohamed, H., E Ghonem, S., & M El-Sayed, S. (2024). Effect of Evidence- Based Guidelines Regarding Port-A-Cath Care on Oncology Nurses' Performance and Patients' Health Outcomes. *Benha Journal of Applied Sciences*, *9*(4), 115-125.
9. Manning-Geist, B. L., Kahn, R. M., Nemirovsky, D., Girshman, J., Laibangyang, A., Gordhandas, S., Iasonos, A., Chui, M. H., Long Roche, K., & Zivanovic, O. (2023). Chemotherapy response in low-grade serous ovarian carcinoma at a comprehensive cancer center: readdressing the roles of platinum and cytotoxic therapies. *Cancer*, *129*(13), 2004-2012.
10. Matton, T., Coolen, J., Vanhaecht, K., Boecxstaens, V., Fourneau, I., & Maleux, G. (2022). Diagnostic error in detection of fractured and migrated totally implantable venous access device fragments and experience with percutaneous retrieval: A report of 27 cases. *The Journal of Vascular Access*, *23*(2), 198-205.
11. Mohammadi-Motlagh, H.-R., Sadeghalvad, M., & Rezaei, N. (2023). Introduction on Cancerous Cells and Metastasis. In *Handbook of Cancer and Immunology* (pp. 1-24). Springer.
12. Naidoo, E. L. (2022). *Assessing infection control knowledge and compliance in theatre at a private hospital in KwaZulu-Natal, South Africa.*
13. Nairuz, T., Mahmud, Z., Manik, R. K., & Kabir, Y. (2023). Cancer stem cells: an insight into the development of metastatic tumors and therapy resistance. *Stem Cell Reviews and Reports*, *19*(6), 1577-1595.
14. Santos-Costa, P., Paiva-Santos, F., Sousa, L. B., Bernardes, R. A., Ventura, F., Fearnley, W. D., . . . Graveto, J. (2022). Nurses' practices in the peripheral intravenous catheterization of adult oncology patients: A mix-method study. *Journal of personalized medicine, 12*(2), 151.
15. Sultana, T. S., Gite, R. M., Tawde, D.

A., Jena, C., Khatoon, K., & Kapoor, M. (2024). Advancing Healthcare Education: A Comprehensive Review of Case-based Learning. *Indian Journal of Continuing Nursing Education, 25*(1), 36-41.

16. Tartari, E., Tomczyk, S., Pires, D., Zayed, B., Rehse, A. C., Kariyo, P., . . . Allegranzi, B. (2021). Implementation of the infection prevention and control core components at the national level: a global situational analysis. *Journal of Hospital Infection, 108*, 94-103.

AUTHOR CONTRIBUTION

Author	Contribution
Iltaf Hussain*,	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Kousar Perveen	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Kousar Perveen	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Syeda Tasneem Kausar,	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Rubina Jabeen	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Rubina Jabeen	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published