



Central venous line care in intensive care unit

Cuidado de vía venosa central en la unidad de cuidados intensivos

Yarintza Coromoto Hernández-Zambrano
ua.yarintzahernandez@uniandes.edu.ec

Universidad Regional Autónoma de Los Andes. UNIANDES, Ambato – Ecuador.
<https://orcid.org/0000-0002-0686-3531>

ABSTRACT

The objective was to determine the level of knowledge about central venous line care in the intensive care unit of the general hospital Teófilo Dávila, located in the province of El Oro in the canton of Machala - Ecuador. The methodological approach was quantitative; statistical data were collected in order to study the variable from a descriptive context of the facts. The population consisted of 14 nursing professionals. The level of knowledge is medium in nursing professionals. With an average of 9.36 out of 20 points. It is important to take into account that the choice of optimal sites for the insertion of a central venous catheter is a complex process that depends on many factors. Paying attention to nurses' workload is of utmost importance to maintain patient safety and improve outcomes.

Descriptors: nursing; health services; skin diseases. (Source: UNESCO Thesaurus).

RESUMEN

El objetivo fue determinar el nivel de conocimiento sobre el cuidado de vía venosa central en la unidad de cuidados intensivos del hospital general Teófilo Dávila, ubicado en la provincia de El Oro en el cantón Machala – Ecuador. El enfoque metodológico fue cuantitativo, se recolectaron datos estadísticos con la finalidad de estudiar la variable desde un contexto descriptivo de los hechos. La población estuvo conformada por 14 profesionales de enfermería. El nivel de conocimiento es medio en los profesionales de enfermería. Con una media de 9,36 de 20 puntos. Es considerable tener en cuenta la elección de sitios óptimos para la inserción de un catéter venoso central es un proceso complejo que depende de muchos factores. Prestar atención a la carga de trabajo de las enfermeras es de suma importancia para mantener la seguridad de los pacientes y mejorar los resultados.

Descriptor: servicio de enfermería; servicio de salud; enfermedad de la piel. (Fuente: Tesoro UNESCO).

Recibido: 9/7/2021. Revisado: 25/8/2021. Aprobado: 2/10/2021. Publicado: 01/04/2022.

Sección artículos de investigación



INTRODUCTION

The human being has been concerned about ensuring the continuity of life and cure conditions that can cause different microorganisms, lifestyles or everyday situations, accidents based on this need since the beginning of time is determined the action of caring for others or themselves, what we currently know as nursing one of the professions dedicated to caring, profession with humanistic approach that ensures care (Carr et al. 2018).

Venous catheterization has a great clinical relevance due to its wide use which is estimated over 70% in hospitalized people and its most common complications. Nursing practice should be based on the available evidence because of its impact on safe patient care. Its application should not only be encouraged in professionals, but should be initiated in nursing education (García-Expósito et al. 2022).

The first central venous catheter was placed more than forty years ago. From materials and placement techniques. Aubaniac in 1952, published the first work on catheters and in 1953, the radiologist Stockholm made known the Seldinger technique after using it to access a central line. One of the most important contributions was made by Broviac in 1973 and Hickman in 1979 when they discovered and used the first silicone catheters, which currently benefit from the central venous line placement procedure, thousands of patients requiring long and ambulatory treatments.

The objective was to determine the level of knowledge about central venous line care in the intensive care unit of the general hospital Teófilo Dávila, located in the province of El Oro in the canton of Machala - Ecuador.

METHOD

The methodological approach was quantitative, statistical data were collected in order to study the variable from a descriptive context of the facts. A non-experimental design, cross-sectional and descriptive type of research was used, because the variable was not deliberately manipulated, information was collected in a specific time and described.

The population consisted of 14 nursing professionals from the intensive care unit of the Teófilo Dávila general hospital in the province of El Oro - Ecuador, under inclusion and exclusion criteria, we worked with all the personnel working in the ICU (nurses), i.e., the sample was not calculated. Within the inclusion criteria we have:

1. The nursing staff must work exclusively in the ICU area.
2. The nursing personnel who voluntarily participate in the research.
3. Nursing personnel of both sexes.

Exclusion criteria:

1. Nursing personnel who do not wish to collaborate with the research.
2. Nursing personnel on vacation.

The survey and questionnaire were previously validated by expert judgment for their respective correction. A pilot test was also carried out using Cronbach's Alpha coefficient with a value of 0.85, making it reliable for its application. This instrument contains 16 multiple-choice questions and was executed using Google Forms. Subsequently, its information was processed using Excel, thus obtaining the tabulation of the data that allowed determining the level of knowledge about central venous line care in the nursing staff of the ICU area of the General Hospital Teófilo Dávila. Descriptive statistics were applied to process the information collected.



RESULTS

The study, made up of 14 health professionals, nurses from the intensive care unit, generated the following results:

According to the results 71.4% responded erroneously that the central venous line (CVC), should be changed in 14 days without the presence of infection. Only 7.1% responded at 7 days. The literature indicates that a CVC used for central venous pressure control (CVP), fluid control and drug delivery require more vigilance for the duration of 1 to 3 weeks.

The solution on the indications for inserting a CVC in the questionnaire is all of the above so no professional opted for this answer, we can observe that 85.7% responded for patients who require various drug infusions that cannot be administered peripherally and 14.3% responded for long-term intravenous treatments.

The insertion of a CVC is indicated for drug administration, parenteral nutrition, hemodynamic monitoring, intravenous procedures, giving access to extracorporeal blood circuits, administration of caustic drugs or maintaining venous access when peripheral access is inadequate.

The 42.9% estimated that the jugular, femoral and subclavian veins are the most common veins for inserting a CVC, and 50% estimated that the internal jugular, subclavian, basilic and femoral veins are the most common.

The veins generally cannulated are, in this order, right and left internal jugular veins, right and left femoral veins, and right and left subclavian veins.

64.3% of the health professionals (nurses) responded to all of the above, concluding that care allows us to administer intravenous medications and solutions, hemodynamic monitoring such as: central venous pressure (CVP), pulmonary pressure, cardiac output, etc., thus minimizing cases of bacteremia infections.

Chlorhexidine 2% soap solution is the first choice antiseptic. It is observed that 42.9% of the respondents answered correctly, while 21.4% answered for 70% alcohol and 4% Chlorhexidine.

It is recommended not to perform routine cultures in the absence of signs and symptoms of infection. Therefore, 35.7% answered correctly and 42.9% answered none of the above and 21.4% answered all of the above.

71.4% of the nursing professionals answered all of the above being the correct answer, while 21.4% answered Pneumothorax and 7.1% answered malpositioning. The most frequent acute and immediate complications after implantation of a central venous catheter are: malpositioning, pneumothorax, air embolism, sepsis, hematoma, hemorrhage from surgical wound, cardiac arrhythmia, etc.

We can evidence that 50% chose the correct answer, while 42.9% have answered for all of the above and 7.1% answered reddening of the skin, purulent drainage. The literature indicates that the main signs of bacteremia are: fever, hypotension, chills.

It is preferable to maintain vigilance during the first 3 hours to prevent complications in the placement of a CVC. We can observe that 50% of the patients answered correctly and 50% answered only during the first hour.

A total of 78.6% answered correctly, while 14.3% answered only hand washing and 7.1% adequate maintenance of the central venous line by nursing.

The six basic low-cost, evidence-based interventions to reduce the rate of CVC-associated bloodstream infections are: 1. 2. Use of 2% chlorhexidine in soap and alcohol. 3. 3. Maximum use of protective barriers for the patient and health care personnel. 4. Insertion of the catheter. CVC removal. Maintenance and proper management of the venous line by nursing. 6.



DISCUSSION

The evaluation systems are important to determine deficiencies in nursing knowledge about CVC, which can help to correct errors in practice and improve the quality of care and patient safety (García-Expósito et al. 2022). Continuous updating on central venous catheters, indications, management and complications is suggested to improve praxis in the intensive care unit, with the aim that health professionals have an adequate profile for the area of work (Cerrato-Sáez, 2020).

The use of ultrasound to guide placement, adequate antiseptic measures, early catheter removal and active surveillance for signs of complications are measures that have shown benefit in the in-hospital patient with a CVC (García-Carranza et al. 2020).

On the other hand; central venous catheters (CVC) are commonly used in critically ill patients and offer several advantages to peripheral intravenous access. However, indwelling CVCs have the potential to cause bloodstream infections, and the risk increases with a number of characteristics, such as catheter choice, catheter location, insertion technique, and catheter maintenance. Evidence-based guidelines have led to a significant reduction in the incidence of bloodstream infections associated with CVCs. The combination of guideline implementation and newer technologies has the potential to further reduce morbidity and mortality from CVC-associated infections (Bell & O'Grady, 2017).

It should be noted that central venous line-associated bloodstream infections can be reduced by a number of interventions including closed infusion systems, aseptic techniques during central venous line insertion and management, early removal of central venous lines, and appropriate site selection (Velasquez-Reyes et al. 2017). In complement, the view of (Burke et al. 2021), posits that central line-associated bloodstream infections (CLABSIs) occurring in intensive care units are associated with increased morbidity and mortality, increased length of hospitalization, and cost of care associated with treatment of CLABSIs. The Centers for Disease Control and Prevention guidelines and checklist package are intended to provide evidence-based recommendations for the prevention of CLABSI. Despite the promotion of central line bundle policies, there is wide variability in compliance and infection rates in intensive care units.

It is important to heed the insight of (Chesshyre et al. 2015), who caution that, with the advancement of pediatric medical care, the use of central venous lines has become a fundamental part of neonatal and pediatric management. Uses include hemodynamic monitoring and administration of life-saving treatments such as intravenous fluids, blood products, antibiotics, chemotherapy, hemodialysis, and total parenteral nutrition (TPN). Despite preventive measures, central venous catheter-related infections are common, with rates of 0.5 to 2.8/1000 catheter days in children and 0.6 to 2.5/1000 catheter days in neonates. Central line infections in children are associated with increased mortality, longer hospital and intensive care unit length of stay, treatment interruptions, and increased complications. Prevention is paramount, using a variety of measures including long-term device tunneling, chlorhexidine antiseptics, maximal sterile barriers, no-touch aseptic technique, minimal line access, and evidence-based care bundles.

On the subject of children, (Gilbert & Cartwright, 2021), highlight that hospital-acquired central line-associated bloodstream infections (CLABSIs) are the leading cause of infections in the pediatric intensive care unit. The bacteria responsible for CLABSIs are spread by healthcare workers, parents and families and mitigated by scrupulous attention to hand hygiene and safety prevention strategies. Maintenance bundles are grouped elements, such as hand hygiene, standardized dressing and tubing changes, and aseptic technique for entering a central line, effective in preventing CLABSIs. Nurses can decrease the incidence of CLABSI by using maintenance bundles and including parents and families in safety prevention strategies."

In another order, the study by (Lacostena-Perez *et al.* 2019), 144 PICCs (Peripheral Access Catheter Centr



CONCLUSION

The study population presented a high level of knowledge of only 7.14% and 85.71% with medium level knowledge.

The level of knowledge is medium in nursing professionals in the ICU area of the General Hospital Teófilo Dávila. With an average of 9.36 out of 20 points.

There are validated tools that allow measuring the knowledge and attitudes of the nursing professional on the use of CVC, both in primary care and in specialized care.

FINANCING

Non-monetary

CONFLICT OF INTEREST

There is no conflict of interest with persons or institutions related to the research.

ACKNOWLEDGMENTS

To the Universidad Regional Autónoma de Los Andes. UNIANDES, Ambato.

REFERENCES

- Aloush, Sami., & Alsaraireh, Faris. (2018). Nurses' compliance with central line associated blood stream infection prevention guidelines. *Saudi medical journal*, 39(3), 273–279. <https://doi.org/10.15537/smj.2018.3.21497>
- Bell, Taison, & O'Grady, Naomi. (2017). Prevention of Central Line-Associated Bloodstream Infections. *Infectious disease clinics of North America*, 31(3), 551–559. <https://doi.org/10.1016/j.idc.2017.05.007>
- Burke, Cherie, Jakub, Karen, & Kellar, Ian. (2021). Adherence to the central line bundle in intensive care: An integrative review. *American journal of infection control*, 49(7), 937–956. <https://doi.org/10.1016/j.ajic.2020.11.014>
- Carr, Peter, Higgins, Niall, Cooke, Marie, Mihala, Gabor, & Rickard, Claire. (2018). Vascular access specialist teams for device insertion and prevention of failure. *The Cochrane database of systematic reviews*, 3(3), CD011429. <https://doi.org/10.1002/14651858.CD011429.pub2>
- Cerrato-Sáez, Patricia. (2020). Variabilidad en la práctica clínica de los cuidados de los Sistemas de Acceso Venoso Totalmente Implantados a partir de la revisión de los cuestionarios y encuestas sobre su manejo [Variability in clinical practice in the care of Totally Implanted Venous Access Systems from review of questionnaires and surveys on their management]. *Ene*, 14(2), 14211.
- Chesshyre, Emily, Goff, Zoy, Bowen, Asha, & Carapetis, Jonathan. (2015). The prevention, diagnosis and management of central venous line infections in children. *The Journal of infection*, 71 Suppl 1, S59–S75. <https://doi.org/10.1016/j.jinf.2015.04.029>
- García-Carranza, Alejandra, Caro-Pizarro, Valeria, Quirós-Cárdenas, Guiliana, Monge-Badilla, María, & Arroyo-Quirós, Alejandra. (2020). Catéter venoso central y sus complicaciones [Central venous catheter and its complications]. *Revista Medicina Legal de Costa Rica*, 74-86.
- García-Expósito, Judith, Reguant, Mercedes, Almenta-Saavedra, José Alberto, Segura, Claudia Díaz, & Roca, Judith. (2022). Un instrumento de evaluación del aprendizaje para el manejo de catéteres venosos periféricos: adaptación, extensión y validación en español



- [A learning assessment instrument for the management of peripheral venous catheters: adaptation, extension and validation in Spanish]. *Enfermería Global*, 21(66), 158-183. <https://dx.doi.org/10.6018/eglobal.493061>
- Gilbert, Ariel, & Cartwright, Cathy. (2021). Enlisting Parents to Decrease Hospital-Acquired Central Line-Associated Infections in the Pediatric Intensive Care Unit. *Critical care nursing clinics of North America*, 33(4), 431-440. <https://doi.org/10.1016/j.cnc.2021.08.004>
- Hina, Hedaya, & McDowell, Joan. (2017). Minimising central line-associated bloodstream infection rate in inserting central venous catheters in the adult intensive care units. *Journal of clinical nursing*, 26(23-24), 3962-3973. <https://doi.org/10.1111/jocn.13824>
- Lacostena-Pérez, M. E., Buesa-Escar, A. M., & Gil-Alós, A. M. (2019). Complications related to the insertion and maintenance of peripheral venous access central venous catheter [Complicaciones relacionadas con la inserción y el mantenimiento del catéter venoso central de acceso periférico]. *Enfermería intensiva*, 30(3), 116-126. <https://doi.org/10.1016/j.enfi.2018.05.002>
- Lai, Nai, An-Lai, Nai, O'Riordan, Elizabeth, Chaiyakunapruk, Nathorn, Taylor, Jacqueline, & Tan, Kenneth. (2016). Skin antiseptics for reducing central venous catheter-related infections. *The Cochrane database of systematic reviews*, 7(7), CD010140. <https://doi.org/10.1002/14651858.CD010140.pub2>
- Perin, Daniele, Erdmann, Alacoque, Higashi, Giovana, & Sasso, Teresinha. (2016). Evidence-based measures to prevent central line-associated bloodstream infections: a systematic review. *Revista latino-americana de enfermagem*, 24, e2787. <https://doi.org/10.1590/1518-8345.1233.2787>
- Schwanke, Alessandra, Danski, Mitzy, Pontes, Leticia, Kusma, Solena, & Lind, Jolline. (2018). Central venous catheter for hemodialysis: incidence of infection and risk factors. *Revista brasileira de enfermagem*, 71(3), 1115-1121. <https://doi.org/10.1590/0034-7167-2017-0047>
- Velásquez-Reyes, Diana, Bloomer, Melissa, & Morphet, Julia. (2017). Prevention of central venous line associated bloodstream infections in adult intensive care units: A systematic review. *Intensive & critical care nursing*, 43, 12-22. <https://doi.org/10.1016/j.iccn.2017.05.006>