Jurnal Penelitian Kesehatan Rs Unram
Volume 1, Number 2, June 2025
Page: 23-28

Vascular Access Emergencies in The Dialysis Patient in NTB Provincial General Hospital: A Retrospective Study

Lalu Rifal Hadi Anugra[1], Maz Isa Ansyori Arsatt[1*]

[1]Department of Medicine, Faculty of Medicine and Health Sciences, University of Mataram, Indonesia.

Article Info

Article History
Revised: May 25, 2025
Accepted: June 10, 2025
Published: June 30, 2025

*Corresponding Author:
Maz Isa Ansyori Arsatt,
Department of Medicine, Faculty of Medicine and Health Sciences, University of Mataram, Indonesia.
aann.ansyori@gmail.com

Abstract

Double lumen catheter (DLC) is a commonly used temporary vascular access in patients with chronic kidney disease (CKD) undergoing hemodialysis. Despite its effectiveness, the use of DLC carries a high risk of emergent complications such as infection, catheter dysfunction, and systemic clinical deterioration. This study aimed to evaluate the clinical characteristics and risk factors associated with emergency DLC insertion at the Provincial General Hospital of West Nusa Tenggara. A retrospective observational study was conducted involving 91 patients who underwent DLC insertion in the emergency operating room (OK CITO) from January to March 2024. Data were obtained from the hospital's procedural registry and analyzed descriptively. The results showed that most patients were male (65.9%) and belonged to adult or elderly age groups. The most frequent site of catheter insertion was the right internal jugular vein (94.5%). The leading risk factors indicating emergency DLC placement included catheter dislodgement (26.4%), catheter dysfunction (17.5%), decreased consciousness (15.4%), and shock (9.9%). These indications were largely related to advanced complications of CKD. The findings highlight the essential role of DLC in urgent clinical scenarios but also emphasize the need for preventive measures through proper catheter care, post-insertion monitoring, and patient education to reduce complications and improve the safety of hemodialysis treatment.

Keywords: Double lumen catheter, hemodialysis, vascular access, catheter-related complications, chronic kidney disease.

INTRODUCTION

Chronic kidney disease (CKD) is a major and growing global public health concern, with its incidence and prevalence rising sharply over recent decades, particularly in low- and middle-income countries. In 2021, an estimated 673.7 million people worldwide were living with CKD, representing an increase of 92% since 1990, and accounting for approximately 8.5% of the global population. This dramatic rise is largely attributed to population growth, aging, and the increasing prevalence of risk factors such as diabetes and hypertension. The burden of CKD is not evenly distributed, with more than 60% of cases concentrated in countries with low and middle sociodemographic indices, where access to healthcare and early intervention is often limited Xie et al., 2018).

Furthermore, CKD has become one of the leading causes of death globally, with mortality and disability-adjusted life years (DALYs) continuing to increase, especially in regions such as Central Asia and Central Latin America. These trends highlight the urgent need for comprehensive strategies focused on prevention, early detection, and improved healthcare access to address the rising global burden of CKD and reduce health disparities between regions and countries (Guo et al., 2025).

.

Hemodialysis (HD) is the most commonly used renal replacement therapy for patients with end-stage renal disease (ESRD), and its success depends critically on reliable vascular access. Autogenous arteriovenous fistulas (AVFs) are the preferred long-term access due to their superior durability and lower risk of infection, but they require a maturation period before use. For immediate or short-term access, central venous catheters, such as double lumen catheters (DLCs), are often utilized because they can be used right away (Sahasrabudhe & Bindu, 2021).

HD is the primary treatment for most ESRD patients, with vascular access being a key determinant of treatment effectiveness and patient outcomes. There are three main types of vascular access for HD: native AVFs, arteriovenous grafts (AVGs), and central venous catheters (CVCs) (Braun & Khayat, 2021). Among these, AVFs are considered the gold standard due to their high long-term patency rates, lower complication rates, and association with improved survival (Jaswel et al., 2025). However, AVFs require several weeks to months to mature before they can be used for dialysis. In contrast, CVCs and AVGs can provide immediate access but are associated with higher risks of infection and other complications. The National Kidney Foundation

Citation: Anugra, L. R. H., & Arsatt, M. I. A. (2025). Vascular access emergencies in the dialysis patient in NTB provincial general hospital: a retrospective study. *Jurnal Penelitian Kesehatan RS Unram, 1*(2), 8–14.

recommends AVFs as the first choice for vascular access, with AVGs and CVCs reserved for cases where AVFs are not feasible or when urgent access is needed. The choice of access type should be individualized based on patient factors, urgency, and anticipated duration of dialysis (Randhawa et al., 2025; Woodside et al., 2018).

While double-lumen catheters (DLCs) provide immediate vascular access for hemodialysis, their use is associated with significant risks. Major complications include catheter-related bloodstream infections, thrombosis, and mechanical issues, all of which can negatively impact patient outcomes. DLCs and other central venous catheters are linked to decreased patient survival and increased rates of morbidity and hospitalization compared to arteriovenous fistulas (AVFs) or grafts. These risks are further exacerbated in patients with common comorbidities such as diabetes, hypertension, and cardiovascular disease, which are prevalent in the hemodialysis population. Additionally, complications like central venous stenosis and infection are frequent with catheter use, contributing to higher healthcare utilization and poorer overall prognosis for patients who remain catheter-dependent (Shingarev & Yevzlin, 2014; Chan et al., 2007; Yevzlin & Asif, 2009).

In Indonesia, the number of hemodialysis (HD) patients has risen sharply in recent years, as reflected in national registry data showing a significant increase in both new and active cases. Despite this rapid growth, there is still a lack of comprehensive information regarding the complications and clinical indications associated with emergency double-lumen catheter (DLC) placement, particularly in regional referral centers such as the West Nusa Tenggara Provincial General Hospital. Documenting the clinical characteristics and indications for DLC use in emergency settings is essential for developing more effective vascular access management strategies, minimizing complications, and improving patient outcomes. Therefore, this retrospective study is designed to analyze the clinical profiles, risk factors, and emergency indications for DLC placement among hemodialysis patients at the West Nusa Tenggara Provincial General Hospital, with the goal of providing valuable data to inform future clinical practice and policy (Lestari et al., 2021; Edi et al., 2021; Andhika et al., 2025; Abdurahman et al., 2019).

MATERIALS AND METHODS

This study employed a retrospective observational design to evaluate the clinical characteristics and risk factors associated with emergency double lumen catheter (DLC) placement in hemodialysis patients. The research was conducted at the West Nusa Tenggara Provincial General Hospital (RSUD Provinsi NTB), a tertiary referral center in eastern Indonesia. The study period covered all emergency DLC insertions performed between January and March 2024.

Study Population and Sampling

The study population included all patients who underwent emergency DLC placement in the operating unit "OK CITO" during the specified period. A total of 91 patients were included using a consecutive sampling method, based on eligibility criteria: patients who received temporary vascular access via DLC for hemodialysis and whose data were recorded in the procedural register. Exclusion criteria included incomplete medical records or non-dialysis indications for catheter insertion.

Data Collection

Patient data were extracted from the surgical procedure registry and included demographic variables (age, sex), insertion site of the catheter, and clinical indications for emergency DLC placement. The indications were categorized based on physician documentation and clinical presentation, such as catheter dislodgement, dysfunction, infection, altered mental status, hypotension, generalized weakness, and absence of vascular access.

Data Analysis

All data were compiled and analyzed using descriptive statistical methods. Frequencies and percentages were calculated for categorical variables, and results were tabulated to identify the most common clinical indications and characteristics of patients undergoing emergency DLC placement. No inferential statistical tests were conducted, given the descriptive nature of the study.

Ethical Considerations

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Ethical clearance was obtained from the institutional research board of the Faculty of Medicine, University of Mataram. As this was a retrospective study, informed consent was waived, and all data were anonymized to ensure patient confidentiality.

RESULTS AND DISCUSSION

Patient Characteristics

A total of 91 patients underwent emergency double lumen catheter (DLC) insertion during the study period. The majority were male (n = 60; 65.9%) and belonged to the adult (20–59 years, 64.8%) and elderly (≥60 years, 34.1%) age groups. Only one patient (1.1%) was categorized as an adolescent. Regarding anatomical site, the most common site of catheter insertion was the right internal jugular vein (n = 86; 94.5%), followed by the left internal jugular vein (n = 3; 3.3%) and femoral vein (n = 2; 2.2%).

Tabel 1 Patient Demographics and Insertion Site

No	Variable	Category	n	(%)
1	Sex	Male	60	(65.9%)
		Female	31	(34.1%)
2	Age group	Adolescent (13–19 years)	1	(1.1%)
		Adult (20–59 years)	59	(64.8%)
		Elderly (≥60 years)	31	(34.1%)
3	Insertion site	Right Internal Jugular Vein	86	(94.5%)
		Left Internal Jugular Vein	3	(3.3%)
		Femoral Vein	2	(2.2%)

Clinical Indications for Emergency DLC Placement

The most common clinical indication for emergency catheterization was catheter dislodgement (n = 24; 26.4%), followed by catheter dysfunction (n = 16; 17.5%), decreased level of consciousness (n = 14; 15.4%), general weakness (n = 12; 13.2%), shock (n = 9; 9.9%), CDL-related infection (n = 7; 7.7%), edema (n = 6; 6.6%), and absence of other vascular access (n = 3; 3.3%).

Tabel 2 Indications for Emergency DLC Placement

No	Indication	n (%)
1	Catheter dislodgement	24 (26.4%)
2	Catheter dysfunction	24 (26.4%)
3	Decreased consciousness	14 (15.4%)
4	General weakness	12 (13.2%)
5	Shock	9 (9.9%)
6	CDL-related infection	7 (7.7%)
7	Edema	6 (6.6%)
8	No available vascular access	3 (3.3%)

Discussion

This study demonstrates that emergency double-lumen catheter (DLC) placement is most common among adult and elderly male patients with advanced chronic kidney disease (CKD), reflecting a broader trend of higher CKD prevalence and hemodialysis dependence in males. Similar demographic patterns have been observed in both national and international studies, where males and older adults constitute the majority of patients requiring urgent hemodialysis, often due to comorbidities such as hypertension and diabetes (Hani et al., 2025; Dinçer et al., 2024; Putu et al., 2024; Teuwafeu et al., 2022; Almeida et al., 2024).

Regarding vascular access, the right internal jugular vein is frequently chosen for catheter insertion in emergency settings. This preference is supported by clinical practice, as the right internal jugular vein offers a more direct route to the superior vena cava, facilitating easier and safer catheter placement while minimizing the risk of complications such as stenosis. The use of this site aligns with established guidelines and is consistently reported in studies examining emergency hemodialysis access (Teuwafeu et al., 2022; Almeida et al., 2024).

In summary, the predominance of emergency DLC use among older male CKD patients and the preference for the right internal jugular vein for catheter placement are well-supported by recent clinical research and reflect best practices in emergency hemodialysis management.

Catheter dislodgement is a frequent complication in both peripheral and central venous catheters, often leading to treatment interruption and increased healthcare costs (Marsh et al., 2021).

Dislodgement rates for peripheral intravenous catheters have been reported at 7%, with risk factors including female gender, catheter placement in the wrist or hand, and insertion by less experienced providers (Marsh et al., 2021). In pediatric oncology patients, port-A catheter dislodgement occurred in 2.4% to 4.1% of cases, most commonly at the site of anastomosis to the port, and was often associated with catheter dysfunction (Wang et al., 2013; Ho et al., 2008). In emergency department settings, dysfunction was the most prevalent complication, followed by extravasation and dislodgement, and was associated with factors such as agitation, lack of caregiver support, and comorbidities (Urbina et al., 2024). Securement methods play a crucial role in preventing dislodgement; for example, subcutaneous anchor securement systems significantly reduced dislodgement rates compared to sutureless devices in pediatric central venous catheters (Kleidon et al., 2024).

Novel safety devices, such as tension-activated safety release valves, have also been developed to prevent accidental dislodgement by disconnecting the tubing when excessive force is applied, thereby maintaining catheter integrity and reducing complications (Moureau, 2023; Munoz-Mozas, 2022). Additionally, catheter tip location influences dysfunction rates, with tips placed in the superior vena cava associated with lower dysfunction compared to deeper placements (Soh et al., 2022). These findings highlight the importance of proper securement, careful site selection, and attention to patient-specific risk factors to minimize catheter dislodgement and dysfunction (Marsh et al., 2021; Moureau, 2023; Urbina et al., 2024; Munoz-Mozas, 2022; Wang et al., 2013; Kleidon et al., 2024; Ho et al., 2008; Soh et al., 2022).

Systemic complications such as decreased consciousness and shock were also significant contributors. These are often clinical manifestations of uremic encephalopathy, sepsis, or fluid overload—conditions requiring urgent hemodialysis facilitated by immediate vascular access. Uremic encephalopathy typically occurs when glomerular filtration rate drops below 15 mL/min and can rapidly progress without prompt dialysis (Goldstein & Graham, 2013).

The results underscore the critical need for early recognition of catheter complications and implementation of strict protocols for catheter care and surveillance. Education for patients and healthcare providers on the maintenance of temporary catheters is essential to reduce unplanned replacements and improve outcomes.

CONCLUSION

This study revealed that emergency double lumen catheter (DLC) placement was most frequently required in adult and elderly male patients with chronic kidney disease, particularly due to catheter dislodgement, dysfunction, and systemic complications such as decreased consciousness and shock. The right internal jugular vein remained the preferred access site due to its anatomical advantages. These findings emphasize the urgent need for improved catheter care protocols, early detection of complications, and proper patient education to reduce the burden of emergency vascular access procedures in hemodialysis patients. Strengthening preventive strategies and infection control measures may contribute significantly to reducing morbidity, mortality, and healthcare costs associated with DLC-related complications.

REFERENCES

Abdurahman, A., Bandiara, R., & Supriyadi, R. (2019). Mon-055 the growing burden of end stage renal disease in indonesia: ten years of the indonesian renal registry reports. *Kidney International Reports*. https://doi.org/10.1016/J.EKIR.2019.05.843.

Almeida, C., Da Costa Ferreira, B., Carneiro, S., & Neves, L. (2024). Neuromuscular function in people with chronic kidney disease on hemodialysis initiation. Brazilian *Journal of Physical Therapy*. https://doi.org/10.1016/j.bjpt.2024.100685.

Andhika, R., A., Supriyadi, R., Bandiara, R., Sukesi, L., Sudarmadi, A., Wahyudi, K., & Sofiatin, Y. (2025). One-year Survival of End-Stage Kidney Disease Patients Undergoing Hemodialysis in Indonesia. *International Journal of Nephrology and Renovascular Disease*, 18, 87 - 101. https://doi.org/10.2147/IJNRD.S508012.

Braun, M., & Khayat, M. (2021). *Kidney Disease: End-Stage Renal Disease*. FP essentials, 509, 26-32.

Chan, M., Sanchez, R., Young, H., & Yevzlin, A. (2007). Vascular Access Outcomes in the Elderly Hemodialysis Population: A USRDS

Study. *Seminars in Dialysis*, 20. https://doi.org/10.1111/j.1525-139X.2007.00370.x.

Cockwell, P., & Fisher, L. (2020*). The global burden of chronic kidney disease*. Lancet. https://doi.org/10.1016/S0140-6736(19)32977-0.

Dinçer, T., Dincer, M., Yalın, S., Trabulus, S., Seyahi, N., & Altıparmak, M. (2024). Renal and patient outcomes of emergency hemodialysis in elderly individuals: a retrospective cohort study. *International urology and nephrology*. https://doi.org/10.1007/s11255-024-04145-y.

Edi, P., Hidayat, N., & Antares, J. (2021). Vascular Access Profile at Sentra Medika Hospital. *International Journal of Science and Research (IJSR)*. https://doi.org/10.21275/sr21116095958.

Guo, J., Jiao, W., Xia, S.*, Xiang, X., Zhang, Y., Ge, X., & Sun, Q. (2025). The global, regional, and national patterns of change in the burden of chronic kidney disease from 1990 to 2021*. BMC Nephrology, 26. https://doi.org/10.1186/s12882-025-04028-z.

Hani, F., A., &, A. (2025). Causes and Profiles Pertaining to the Emergency Room Admission of Stage V Chronic Kidney Disease Patients Undergoing Regular Hemodialysis at a Tertiary Hospital in Surabaya, Indonesia. *Current Internal Medicine Research and Practice Surabaya Journal.* https://doi.org/10.20473/cimrj.v6i1.66432.

Ho, C., Chou, C., Chang, T., Jan, S., Lin, M., & Fu, Y. (2008). Dislodgment of port-a-cath catheters in children.. *Pediatrics and neonatology*, 49 5, 179-82. https://doi.org/10.1016/S1875-9572(09)60005-X.

Jaswel, L., Oste, N., & Vaidy, S. (2025). Arteriovenous Fistula Creation for Hemodialysis in Patients with End-Stage Renal Disease with and Without Surgical Drain: A Randomized Control Trial. *Barw Medical Journal.* https://doi.org/10.58742/bmj.v3i2.170.

Kleidon, T., Schults, J., Gibson, V., Roebuck, D., Peirce, D., Royle, R., Ware, R., Byrnes, J., Andresen, E., Cattanach, P., Dean, A., Pitt, C., Ramstedt, M., Mcbride, C., Hall, S., Rickard, C., & Ullman, A. (2024). Securement to Prevent Noncuffed Central Venous Catheter Dislodgement in Pediatrics: The SECURED Superiority Randomized Clinical Trial.. *JAMA pediatrics.* https://doi.org/10.1001/jamapediatrics.2024.2202.

Lestari, S., Kuswadi, I., & Prasanto, H. (2021). Management of Thirst in Hemodialysis Patients in Primary Services. *Review of Primary Care Practice and Education (Kajian Praktik dan Pendidikan Layanan Primer).* https://doi.org/10.22146/rpcpe.70027.

Marsh, N., Larsen, E., Takashima, M., Kleidon, T., Keogh, S., Ullman, A., Mihala, G., Chopra, V., & Rickard, C. (2021). Peripheral intravenous catheter failure: A secondary analysis of risks from 11,830 catheters. *International journal of nursing studies*, 124, 104095. https://doi.org/10.1016/j.ijnurstu.2021.104095.

Moureau, N. (2023). Device profile of the Orchid safety release valve for the prevention of accidental catheter dislodgement. *Expert Review of Medical Devices*, 20, 529 - 536. https://doi.org/10.1080/17434440.2023.2216383.

Munoz-Mozas, G. (2022). Solving the problem of IV dislodgement. *British journal of nursing*, 31 2, S4-S7. https://doi.org/10.12968/bjon.2022.31.2.s4.

Putu, D., Adi, S., K., Sudhana, W., & Dwi, O. (2024). An urgent hemodialysis in an adult male patient with chronic kidney disease: a case report. *Intisari Sains Medis*. https://doi.org/10.15562/ism.v15i2.2052.

Qin, K., Qing, J., Wang, Q., & Li, Y. (2024). *Epidemiological shifts in chronic kidney disease: a 30-year global and regional assessment*. BMC Public Health, 24. https://doi.org/10.1186/s12889-024-21065-9.

Randhawa, M., Jamil, M., Khan, K., Irfan, M., Begum, R., & Butt, T. (2025). Brachio-Cephalic AVF as a Preferred Autogenous

Hemodialysis Access in Elderly Chronic Kidney Disease Patients. *Pakistan Armed Forces Medical Journal*. https://doi.org/10.51253/pafmj.v75isuppl-2.6975.

Sahasrabudhe, P., & Bindu, A. (2021). Nuances of Arteriovenous Fistula Creation for Vascular Access in Hemodialysis. *Indian Journal of Plastic Surgery: Official Publication of the Association of Plastic Surgeons of India*, 54, 257 - 263. https://doi.org/10.1055/s-0041-1734576.

Shingarev, R., & Yevzlin, A. (2014). Approach to a Nonfunctioning Catheter. *Interventional Nephrology*. https://doi.org/10.1007/978-1-4614-8803-3_9.

Soh, N., Tan, B., Chan, S., Patel, A., Gogna, A., Zhuang, K., Tashi, S., Venkatanarasimha, N., Tay, K., & Chandramohan, S. (2022). Deeper may not be better: relationship between catheter dysfunction and location of the catheter tip in right-sided tunnelled haemodialysis catheters.. *Clinical radiology*. https://doi.org/10.1016/j.crad.2022.04.020.

Teuwafeu, D., Joseph, N., Mahamat, M., Aristide, N., François, K., & Gloria, A. (2022). Epidemiological and Clinical Profiles of Chronic Kidney Disease Patients Presenting for Emergency Hemodialysis: A Five-Year Retrospective Study in Two Dialysis Centres in Cameroon. *Open Journal of Nephrology*. https://doi.org/10.4236/ojneph.2022.121007.

Urbina, A., Juvé-Udina, M., Adamuz, J., González-Samartino, M., Jiménez-Martínez, E., Delgado-Hito, P., & Romero-García, M. (2024). Association between peripheral venous catheter failure and care complexity factors in emergency department: a cross-sectional study. *BMJ Open*, 14. https://doi.org/10.1136/bmjopen-2024-090101.

Wang, S., Tsai, C., Hou, C., Lee, S., Ko, S., Hsiao, C., Chen, Y., Chuang, J., & Sheen, J. (2013). Dislodgement of port-A catheters in pediatric oncology patients: 11 years of experience. *World Journal of Surgical Oncology*, 11, 191 - 191. https://doi.org/10.1186/1477-7819-11-191.

Woodside, K., Bell, S., Mukhopadhyay, P., Repeck, K., Robinson, I., Eckard, A., Dasmunshi, S., Plattner, B., Pearson, J., Schaubel, D., Pisoni, R., & Saran, R. (2018). Arteriovenous Fistula Maturation in Prevalent Hemodialysis Patients in the United States: A National Study.. *American journal of kidney diseases: the official journal of the National Kidney Foundation*, 71 6, 793-801. https://doi.org/10.1053/j.ajkd.2017.11.020.

Xie, Y., Bowe, B., Mokdad, A., Xian, H., Yan, Y., Li, T., Maddukuri, G., Tsai, C., Floyd, T., & Al-Aly, Z. (2018). Analysis of the Global Burden of Disease study highlights the global, regional, and national trends of chronic kidney disease epidemiology from 1990 to 2016.. *Kidney international*, 94 3, 567-581. https://doi.org/10.1016/j.kint.2018.04.011.

Yevzlin, A., & Asif, A. (2009). Stent placement in hemodialysis access: historical lessons, the state of the art and future directions. *Clinical journal of the American Society of Nephrology: CJASN*, 4 5, 996-1008. https://doi.org/10.2215/CJN.04040808.