

Registered Nurses' Knowledge of Intravenous Fluid Therapy at a Teaching Hospital in Namibia: A Cross-Sectional Survey

SAGE Open Nursing
Volume 10: 1–9
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DOI: 10.1177/23779608241272607
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Nestor Tomas, MPH  and Luise Ndiwakalunga Kamati, BNS

Abstract

Introduction: Insufficient knowledge of intravenous fluid therapy is a significant challenge contributing to morbidity and mortality in hospitalized patients. Nurses play a critical role in evaluating patients' fluid and electrolyte balance as well as in restoring fluid levels. Various studies have indicated a deficiency in nurses' knowledge of intravenous therapy, yet this remains understudied in many settings, including Namibia.

Objectives: To assess nurses' knowledge of intravenous fluid therapy and to describe the variables associated with knowledge of intravenous fluid therapy at a teaching hospital in Namibia.

Methods: A cross-sectional online survey involving 164 nurses who were recruited using total population sampling. Data were collected between September and November 2021, using a self-administered 14-item validated tool ($\alpha = 0.8$). Data analysis was conducted using SPSSv28.0 software.

Results: The majority of nurses (84%) in this study exhibited an insufficient level of knowledge regarding intravenous therapy, with only a minority (16%) demonstrating a moderately adequate understanding of intravenous fluid therapy. A significant positive correlation was found between educational qualification and knowledge of intravenous therapy ($r = 0.21$; $p = .01$).

Conclusion: The study's results indicate a worrying trajectory in nurses' knowledge of intravenous therapy. These findings underscore the need for hospitals to establish comprehensive training programs for nurses to guarantee the provision of secure and efficient intravenous therapy. Additional research is needed to investigate how educational qualifications impact patient outcomes related to intravenous therapy.

Keywords

clinical competence, fluid therapy, knowledge, Namibia, teaching hospital, water–electrolyte balance

Received 24 April 2023; Revised 16 June 2024; accepted 5 July 2024

Introduction

Insufficient knowledge of intravenous therapy (IVT) among nurses has been identified as a significant contributing factor to prolonged hospitalization and increased morbidity and mortality among patients (Njung'e & Kamolo, 2021). IVT is the administration of fluids, medications, and other supportive treatments via intravenously. IVT plays an essential role in correcting fluid volume deficits or acute hypovolemia that cannot be adequately addressed through oral intake alone (Malbrain et al., 2020). Since nurses are responsible for assessing patients' fluid and electrolyte levels and for replenishing fluid volumes, they play a crucial role in ensuring IVT safety (Guest, 2020). Despite nurses' critical role, however, several studies have suggested that many nurses lack adequate

knowledge of and skills in IVT (Lamsal & Shrestha, 2019; Tailor et al., 2020).

Review of Literature

Approximately 25 million individuals worldwide undergo peripheral IVT annually (Lamsal & Shrestha, 2019). Unfortunately, research has revealed that up to 20% of

Department of General Nursing Science, School of Nursing, Faculty of Health Sciences, University of Namibia (UNAM), Rundu, Namibia

Corresponding Author:

Nestor Tomas, Department of General Nursing Science, School of Nursing, Faculty of Health Sciences, University of Namibia (UNAM), PO Box 88, Kaisosi Road, Rundu, Namibia.
Email: ntomas@unam.na



patients are subject to erroneous IVT practices due to nurses' insufficient knowledge of IVT (Njung'e & Kamolo, 2021). The administration of IVT is a collaborative effort between nurses and physicians. It is of utmost importance that nurses possess a thorough understanding of IV solutions to ensure patient safety and to minimize the risk of complications, which leads to favorable patient outcomes (Piredda et al., 2019). There are three primary classifications for IV fluids, namely crystalloids, colloids, and blood products. Crystalloid solutions are the most frequently administered fluid replacements and contain a mixture of water and electrolytes that can pass through semipermeable membranes. Essentially, nurses are involved in the use of hypertonic, hypotonic, and isotonic solutions as well as the buffer system. Thus, nurses need to possess the correct knowledge of how and when to use these solutions (Pourdeljoo & Tourunen, 2021; Lopez & Hall, 2021).

Nurses are expected to be knowledgeable about hemodynamic resuscitation, hemodynamic status, and preventing IVT-related complications such as edema and fluid overload (Lamsal & Shrestha, 2019; Nasa et al., 2022). The appropriate selection of fluids from the three primary IV fluid categories (crystalloid, colloid, and blood products) is based on nurses' knowledge of vascular system anatomy and physiology (Lamsal & Shrestha, 2019; Tailor et al., 2020).

Pourdeljoo and Tourunen's (2021) study found that various types of fluids have distinct effects on the expansion of extracellular fluid, thus influencing fluid equilibrium. Conversely, colloid and blood products solutions namely albumin and plasma comprise of sizable molecules that are unable to pass through semipermeable membranes (van den Brink et al., 2021; Kumar et al., 2022). As a result, they remain confined within the blood vessels and serve as volume expanders due to their notable oncotic pressure. Therefore, nurses' knowledge plays a pivotal role in the selection of appropriate IVF depending on the patient's clinical condition and contraindications.

Nurses must exercise extreme care in administering infusion therapy to ensure patient safety and quality care (Gorski, 2016). Smith (2017) and Malbrain et al. (2020) also stress the significance of identifying potential complications to avoid unnecessary fluid shifts, breathing difficulties, and elevated blood pressure. However, the literature has warned of several complications arising from inadequate knowledge of IVT such as infiltration, extravasation, thrombophlebitis, and infections (Lamsal & Shrestha, 2019). Other reported complications with fluid calculation and preparation include hypovolemia, fluid overload, and pulmonary edema (Othman & Ahmed, 2019). Insufficient understanding of IV infusion has the capacity to compromise the standard of patient care resulting in unfavorable outcomes.

The regulation of nursing education in Namibia falls under the jurisdiction of the Nursing Council of Namibia (The Government Republic of Namibia. Ministry of Health and Social Services, 2014). The country primarily offers two training programs: a 2-year certificate program for enrolled nurses category and a

degree/diploma program for the category of registered nurses. A basic diploma is ranked at level 6 or 7 by the Namibia Qualifications Authority. A postdiploma is equivalent to a bachelor's degree at level 8 on the Namibian Qualifications Framework (NQF), while a master's degree is at level 9 (Namibian Qualifications Authority, 2014). Despite these qualifications having different NQF levels, all lead to individuals to graduate as registered nurses, the highest professional designation within the nursing field in Namibia responsible for managing and overseeing the fluid, electrolyte, and acid-base balance of patients (Republic of Namibia, 2014). Research found that nurses with a higher qualifications had a significantly higher level of IVT knowledge compared to those without it (Sindahl et al., 2021; Papavramidis et al., 2023).

Despite previous research indicating that nurses have insufficient knowledge of IVT (Lamsal & Shrestha, 2019; Tailor et al., 2020), there is still a scarcity of studies conducted in this crucial area in Namibia. Therefore, regular assessment of registered nurses' competency of IVT is crucial in order to maintain and improve the quality of care provided. This study aimed to assess nurses' knowledge of intravenous fluid therapy and to describe the variables associated with knowledge of intravenous fluid therapy at a teaching hospital in Namibia.

Methods

Design

A cross-sectional descriptive online survey design was employed.

Study Setting

The study was carried out at an intermediate hospital public hospital situated in one of the major town in Kavango East region in Namibia. This referral hospital comprises several inpatient departments with a total of 780 beds. It receives patients from three regions: Kavango East, Kavango West, and the Zambezi region. The hospital is staffed by approximately 170 registered nurses. Nurses in this particular category have varying levels of educational preparation and qualifications. Nevertheless, they hold an essential responsibility in preserving fluid-electrolyte equilibrium and sharing their expertise with nursing students, who represent the future of the nursing field. The location was chosen for its strategic advantage, as it attracted a significant influx of nurses transitioning to larger urban hospitals in pursuit of enhanced career prospects. These individuals also bear the added responsibility of nurturing and mentoring aspiring nurses (Schroers et al., 2020).

Population and Sample

As described by Posserud et al. (2009) the study used a total population sampling method to select the entire population

because it has a particular set of characteristics (i.e., 170 registered nurses who monitor and administer IVT was considered small). However, of the 170 invitations sent, only 164 nurses completed the links after two reminders. This population was suitable because it was within the job scope of registered nurses to institute, maintain, and supervise the fluid, electrolyte, and acid–base balance of a patient (Republic of Namibia, 2014). The inclusion criterion was being a registered nurse at the selected teaching hospital, with at least a basic 4-year university or equivalent qualification in nursing science. The study excluded two registered nurses who declined to participate, as well as four nurses who were on leave during the data collection period.

Research Instrument

The researcher used a modified questionnaire from previous studies (Njung'e & Kamolo, 2021). The questionnaire was written in English and contained two sections. Section A consisted of five close-ended questions on sociodemographics (age, gender, qualification, department, and years of experience). Section B measured nurses' knowledge of IVT using 14 multiple-choice questions. In order to assess the internal reliability of the instrument, the researcher achieved a Cronbach's alpha coefficient of 0.8, surpassing the recommended threshold of 0.70 (Taber, 2018). The content validity of the tool was verified and endorsed by a panel of two expert nurse educators (Yusoff, 2019). In order to evaluate the construct validity, an exploratory factor analysis was performed on the 14 items designed to measure the knowledge of registered nurses. These items were subjected to principal component analysis with Varimax rotation for two assessments: Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity. The KMO value yielded a satisfactory result of 0.75, while the p -value for Bartlett's Test of Sphericity was statistically significant ($p < .00$) as described by Shrestha (2021). Each correct response was given two points and incorrect responses were given one point. The total score ranged from a minimum of 14 to a maximum of 28 points, with the highest score representing a high degree of knowledge and the lowest score representing a low degree of knowledge. The aggregate scores of 80% to 100% denoted adequate knowledge of the administration of IV fluids, 50% to 79% denoted moderate knowledge, and <50% denoted inadequate knowledge. The questionnaire took 15 to 20 min to complete.

Data Collection Procedures

Data were collected through an online survey administered between the months of September and November 2021. The researcher approached the respondents for permission to obtain their cellphone numbers before a link to an online questionnaire (Google forms) was shared via Whatsapp. The questionnaire included detailed information about the study purposes and objectives and asked respondents for

their informed consent to participate. The respondents were duly informed of their prerogative to voluntarily discontinue their participation in the study, albeit not actively promoted. An online survey was necessary due to COVID-19 social distancing restrictions. During the study, privacy and confidentiality were ensured by not asking respondents to reveal any information that could be used to identify them, such as their names. The electronic data were also encrypted with a password only accessible to the researchers.

Data Analysis

Data were analyzed using SPSSv28.0. Descriptive data were presented as frequency percentages, mean, and standard deviation. Pearson correlation analysis were used to determine the relationships between the study variables. A margin error of 5% level of significance was considered significant.

Ethical Considerations

The study respondents provided written informed consent before their participation. The study was approved by the School of Nursing and Public Health Ethical Committee (ref no: SoNEC 34/2022). The Ministry of Health and Social Services (ref No: 13/3/3/LNK001) also ensured that ethical considerations were met. The researchers were further guided by core ethical principles, namely respect for persons, beneficence, and justice, which are all rooted in the imperative to safeguard human rights during the research process (Brink et al., 2018). The individuals participating in the study were asked to provide written consent by selecting the "agreement button" in the hyperlink before they were allowed to proceed to the research questions. Respondents were able to complete the survey in the comfort of their homes, thereby ensuring their privacy. Participation was entirely voluntary and no personal identification data were required, thus ensuring complete confidentiality and anonymity. The electronic data collected were only accessible to the researchers. This study upheld the principles of the revised Declaration of Helsinki.

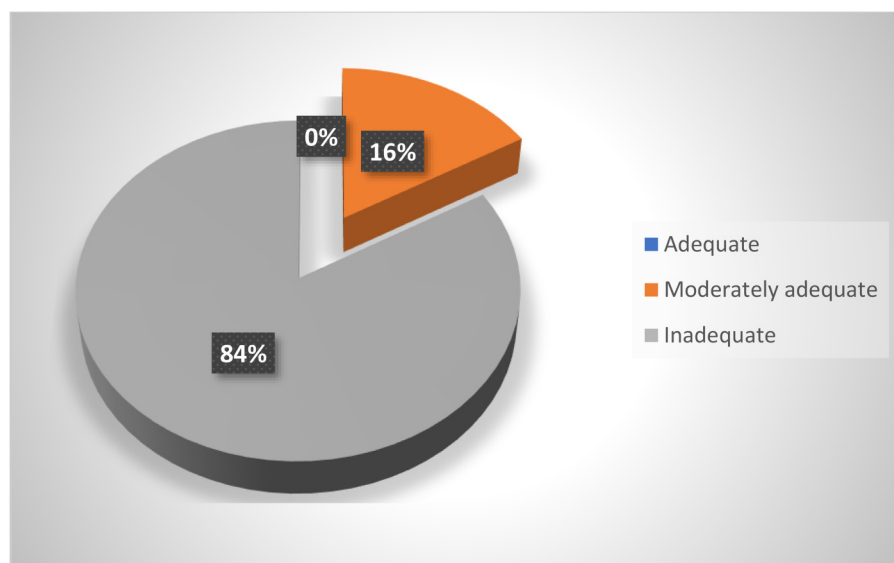
Results

Sociodemographic Characteristics of Studied Nurses

Of the 170 invitations sent to the teaching hospital, about 164 (97% response rate) were completed after two reminders by the researcher. The 3% noncompletion could be explained by nurses' busy schedules due to staff shortages which contributed to their overall exhaustion, since some did not respond even during lunch or teatime. As depicted in Table 1, the mean age of the respondents was 2.52 ± 0.80 with more than half (57%; $n = 93$) of the respondents being females and 43% ($n = 71$) being males. The majority 64% ($n = 107$) were in possession of a bachelor's degree, 34%

Table 1. Sociodemographic Characteristics of Studied Nurses (N = 164).

No.	Variables	Categories	Frequencies (n)	Percentage (%)
1	Age	20–34 years	84	51
		35–50 years	74	45
		>50 years	06	4
		Mean age: 33 years (2.52 ± 0.80)		
2	Gender	Male	71	43
		Female	93	57
3	Qualifications	Diploma	55	34
		Bachelor degree	105	64
		Master's degree	04	2
4	Department	Internal medicine	56	34
		Surgery	30	18
		Obs & Gyn	34	21
		Other departments	44	27
6	Experience	1–5 years	94	57
		5–10 years	23	14
		10–20 years	15	9
		20 years above	32	20

**Figure 1.** Level of nurses' knowledge of intravenous therapy.

($n = 55$) were in possession of a diploma qualification and 2% ($n = 4$) were master's degree holders. Regarding the departments where respondents worked, about 34% ($n = 56$) were from internal medicine, 27% ($n = 44$) were from other departments, 21% ($n = 34$) were from obstetrics and gynecology, and 18% ($n = 30$) were from the surgical department.

Level of Nurses' Knowledge of IV Therapy

A higher proportion of nurses (84%) showed an inadequate level of knowledge while only 16% had a moderately adequate knowledge of IVT (Figure 1).

In assessing the nurses' knowledge of IVT, various basic aspects of IVT were tested (Table 2). A moderate knowledge was found as over half of the nurses (57%, 2.52 ± 0.80) correctly identified IVT as a procedure of giving medications, blood, and nutrients through a vein. About 52% (1.80 ± 1.02) of the respondents correctly identify fluid overload as the risk to look out for when monitoring a patient who received an infusion of 3% sodium chloride. Close to 45% (44%; 1.68 ± 0.69) correctly indicated that the IV tubing line should be changed every 48 to 72 h to minimize the risk of phlebitis, 47% (3.26 ± 0.87) correctly calculated the infusion rate using a macro drip set (15 gtt), while 46% (2 ± 0.82)

Table 2. Level of Nurses' Knowledge of IV Therapy (N = 164).

No.	Variables	Correct knowledge (n)	Percent	Mean \pm SD
1	Which of the following describes the term IV fluid?	93	57	2.52 \pm 0.80
2	What is the most physiological IV fluid in relation to blood plasma?	74	45	2.74 \pm 1.00
3	What are types of IV fluids?	60	37	2.33 \pm 1.13
4	To treat hypernatremia. Which is the safest IV fluid?	35	21	2.59 \pm 1.04
5	Which type of fluid is a potassium free?	47	29	2.46 \pm 1.06
6	To minimize the risk of phlebitis the intravenous catheter should be changed every... hours	72	44	1.68 \pm 0.69
7	A physician orders a continuous infusion of normal saline 800 ml / (8 h). Calculate the infusion rate in macro drip set (15 gtt)?	77	47	3.26 \pm 0.87
8	Which of the following describe the term isotonic?	63	38	3.00 \pm 0.97
9	Which is an example of colloid solution?	60	37	2.51 \pm 1.05
10	A 6-year-old boy is admitted to the pediatric ward with a condition of gastro enteritis. He is having chronic diarrhea which causes him to lose a lot of fluid and become dehydrated. Doctor has ordered 200 mL IV of normal saline 6 hourly (60 gtt). How many drops per hour will you give?	75	46	2.00 \pm 0.82
11	While monitoring a patient who receiving infusion of 3% sodium chloride the nurse should look for what?	85	52	1.80 \pm 1.02
12	The choice and dose of IV fluids are determined by...?	62	38	2.93 \pm 1.09
13	Which ions contained in Ringers lactate?	56	34	2.68 \pm 1.08
14	Which classification of IV fluids that has large molecules and remains within blood vessels as volume expanders due to their oncotic pressure?	49	30	2.63 \pm 0.98

IV=intravenous; SD = standard deviation.

correctly calculated drops per minute using a pediatric administration set (60 gtt). Surprisingly, about 45.1% (2.74 \pm 1.00) of the nurses choose sodium chloride (NaCl) as the most physiological IV fluid related to blood plasma over lactated ringers, while <40% (3 \pm 0.97) could correctly classify IV fluids as isotonic solutions. Only 29% (2.46 \pm 1.06) of the respondents correctly knew that 5% dextrose is a potassium-free solution, while <22% (2.59 \pm 1.04) were able to correctly identify that 5% Dextrose and 0.045% NaCl as the safest IV fluid in the treatment of hypernatremia. Nearly 35% (2.68 \pm 1.07) of the respondents were correctly able to identify potassium, calcium, and chloride as the three ions contained in Ringer's lactate.

Correlation Between Nurses' Knowledge and Demographic Characteristics

Table 3 shows that a positive association exist between knowledge and educational qualifications ($r=0.21$; $p=.01$). Although, female nurses displayed the highest mean knowledge score (57%) compared to males (43%), no correlation was found to exist between gender and knowledge of IVT.

Discussion

This study examined and characterized the understanding of intravenous therapy (IVT) among nurses at a teaching

Table 3. Correlation of Nurses' IV Fluid Knowledge Scores and Sample Characteristics.

Variables		Mean knowledge score (Mean \pm SD)	Pearson r (p -value)
Age	20–34 years	1.42 \pm 0.19	–0.04 (.65)
	35–50 years	1.38 \pm 0.22	
	>50 years	1.50 \pm 0.17	
Gender	Males	1.39 \pm 0.19	0.07 (.36)
	Females	1.42 \pm 0.20	
Qualifications	Diploma	1.35 \pm 0.18	0.21*(.01)
	Bachelor degree	1.43 \pm 0.20	
	Master's degree	1.49 \pm 0.22	
Departments	Internal medicine	1.40 \pm 0.20	0.04 (.64)
	Surgery	1.37 \pm 0.20	
	Obs & Gyn	1.43 \pm 0.22	
	Others	1.41 \pm 0.19	
Years of experience	1–5 years	1.40 \pm 0.20	0.04 (.64)
	6–10 years	1.37 \pm 0.20	
	11–20 years	1.43 \pm 0.22	
	20 years above	1.41 \pm 0.19	

* p -Value (<.05).

IV=intravenous.

hospital in Namibia. The results indicated concerning levels of insufficient knowledge regarding IVT among the nursing staff. These concerning findings are consistent with prior studies in Nepal and Iraq (Lamsal & Shrestha, 2019; Othman & Ahmed, 2019). The findings are, however, different from other similar studies completed at Narayana General Hospital in Nellor, India, and at Kiambu County in Kenya, which both reported their nurses as having moderately adequate knowledge of IVT (ranging from 55% to 57.4%) (Njung'e & Kamolo, 2021; Devi et al., 2016). The disparities observed in the average level of knowledge among nurses in the current study, as compared to previous studies, may be attributed to variations in the methodologies employed, the rating scales utilized and lack of refresher training (Njung'e & Kamolo, 2021). Nevertheless, the deficiencies in nurses' knowledge of routine nursing procedures prompt concerns regarding the standard of care provided to patients. Surprisingly, respondents in this study had neither an appropriate understanding of when to change IV tubing lines to minimize the risk of phlebitis, nor did they know how to correctly calculate the rate of infusion in drops per minute. This lack of critical knowledge is a threat to patients' safety since it increases the risk of high-risk infusion-rate errors (Escrivá Gracia et al., 2019; Schroers et al., 2021) leading to prolonged hospitalization, high healthcare costs, and morbidity (Kaur et al., 2019). Nurses play a crucial role in preventing infections associated with peripheral IV cannulation. According to Osti et al. (2019), however, approximately 67% of patients' experience thrombophlebitis, and of those cases, around 60% are directly related to peripheral IV cannulation. Moreover, the duration of IVT varies depending on the patient's condition. A nurse's lack of knowledge in this area can lead to prolonged hospitalization (Kaur et al., 2019; Papavramidis et al., 2023) due to an increased risk of Nosocomial infections caused by microbial growth at the cannulated sites. These infections are closely linked to longer hospital stays, greater morbidity and mortality rates, as well as higher hospital expenses (Osti et al., 2019).

Contrary to the study by Njung'e and Kamolo (2021), respondents in this study had inadequate knowledge of how to recognize the three ions contained in commonly used solutions such as Ringer's Lactate solution. Respondents also could not identify that lactated ringer is the most physiologically compatible IV fluid in relation to blood plasma. IVT are pharmaceutical products and, like other medications, they carry significant risks that can result in severe or even fatal outcomes if not prescribed and administered with care. A lack of knowledge in this area can lead to electrolyte imbalances in patients (hyponatremia and hypernatremia) due to the inappropriate use of hypotonic and hypertonic solutions (Sindahl et al., 2021; Lathiya et al., 2023). Similarly, electrolyte imbalances can potentially lead to dehydration and metabolic disorders (Abwalaba & Ogutu, 2018). Considering the potential for hospital-acquired hyponatremia/hypernatraemia resulting from the use of hypotonic and hypertonic fluids, it is

crucial that nurses possess a comprehensive understanding of the challenges associated with IV fluid administration. This knowledge will enable them to effectively collaborate with physicians in prescribing appropriate IV fluids, thereby mitigating the risk of hyponatremia or hypernatremia. By fulfilling this responsibility as an integral part of their role, nurses play a vital role in ensuring the delivery of high-quality IVT (Lamsal & Shrestha, 2019). These findings highlight the need for further education and training in this area to ensure the safety and effectiveness of IV treatments. In support of this recommendation, prior studies have claimed that training is regarded as an essential step in achieving high-quality standards in any organization (Lamsal & Shrestha, 2019; Issa et al., 2020; Guest, 2020).

Regarding gender, most respondents in this study were females. This result was comparable with similar studies in Iraq, and Italy on nurses' knowledge of IVT, which found that most respondents were female (67–99%) (Othman & Ahmed, 2019; Simonetti et al., 2019). The results of this study differ from those completed in India and Kenya, where the majority of respondents (61%) were males aged 40 to 49 years (52%) (Tailor et al., 2020; Njung'e & Kamolo, 2021). The differences in sex and age distributions among studies could be attributed to the fact that nursing is a female-dominated practice in most parts of the world, including Namibia (Soliman et al., 2019; Mwetulundila & Indongo, 2022).

The relationship between nurses' level of knowledge and their demographic characteristics revealed an association between their level of education and knowledge. Specifically, this study found a higher means score among nurses holding a master's degree and their knowledge of IVT. These results support a prior study which found a correlation between knowledge and a nurse's level of education ($f=9.01$; $p\leq.00$) (Tailor et al., 2020). While previous studies (Sindahl et al., 2021; Papavramidis et al., 2023) have highlighted the positive impact of higher qualifications on patient outcomes, cost reduction, shorter hospital stays, and decreased complications, it is challenging to generalize that individuals with a master's degree are more knowledgeable than others. This difficulty arises from the fact that only a small portion of the respondents in this research held a master's degree qualification. In a study conducted in Southwest Ethiopia, it was found that nurses with a higher qualifications had a significantly higher level of IVT knowledge compared to those without it (adjusted odds ratio = 1.91, 95% confidence interval [CI]: 3.42–9.14; $p < .05$) (Tesgera et al., 2023). This groundbreaking study revealed a clear correlation between nurses' additional qualifications and their expertise in IVT. However, caution is needed when generalizing the recent findings on knowledge and its relation to qualifications, given the small number of master's holders in this study. Nevertheless, this important finding highlights the significance of higher education in the nursing field and suggests the need for further research to investigate the impact of these educational qualifications on patient outcomes and healthcare delivery.

Surprisingly, this study found no significant association between years of experience and knowledge of IVT. These results signify that despite nurses' expectation that experience is the best source of knowledge, no association could be determined in this study. The lack of correlation between experience and nurses' knowledge of IVT highlights the need for further research to better understand the factors that influence knowledge acquisition among nurses in Namibia. Our research aligns with the study conducted by Kirubakaran and Amirtham (2017) in India. These findings downplay the significance of accumulating years of experience in a nursing field (Indarwati et al., 2022). In contrast to the results of this recent study, previous research has shown a notable correlation between years of experience and IVT knowledge ($p \leq .05$) (Lamsal & Shrestha, 2019; Tesgera et al., 2023). We speculate that the difference in results could be explained by the limitation of the analysis focusing solely on the linear relationship between a pair of variables. This suggests the need to consider performing logistic regression to better understand the nature of the relationship between the variables (Ali & Younas, 2021).

Consistent with previous research findings, the current study did not find any statistically significant associations between age, gender, or department and the level of IVT knowledge (Ahlin et al., 2017; Khalil et al., 2017; Ali & Saud, 2021). Our results differ from those of Lamsal and Shrestha (2019) who found a relationship between age and knowledge of nurses ($p \leq .01$). The differences in results could be due to the use of different measurement tools. Despite the differences across studies, however, it can be concluded from this study that educational level, gender, and years of experience were associated with nurses' knowledge of IVT.

Clearly, the recent findings point to nurses inadequate level of knowledge of IVT. A linear relationship between the nurses' level of educational qualification, specifically the bachelor's degree qualification in this study suggest the importance of acquiring a degree qualification.

Strengths and Limitations

This research study has made a significant contribution to the existing body of knowledge on nurses' knowledge of IVT. The findings offer valuable data that can inform the planning of professional development opportunities for nurses in order to improve the quality of nursing care. The study did, however, have a few limitations, which include the fact that respondents were not able to seek clarification for questionnaire prompts, if necessary, since data was collected via an online survey. The scope of the study was restricted to one setting, a teaching hospital in Namibia. This limits the ability of the researchers to generalize the results to other settings, albeit similar. It is recommended that future studies be conducted with a larger sample size across multiple settings.

Implications for Nursing Practice

The lack of knowledge reported in this can have significant consequences for patient care and safety, including extended hospital stays, heightened healthcare costs, and, potentially, fatalities. However, this study offers valuable data which can have positive implications for the planning of professional development opportunities and quality improvement initiatives that can optimize patient care. Similarly, these results underscore the significance of competence, given the crucial role of IVT in resuscitation. Additionally, these results can serve as a database that can be used to develop effective strategies aimed at addressing gaps in knowledge, improving the confidence levels of nurses, and enhancing IVT practices and the quality of care provided.

Conclusion

The study's findings demonstrate that the nurses in this study had an inadequate level of knowledge of IVT. The deficit in knowledge could have serious implications for patient care and safety, including prolonged hospitalization, the burden of healthcare costs, and even death. To improve upon the lack of knowledge in this critical area of patient care, these results highlight the urgent need for every hospital to recognize and implement continuous refresher training programs for their nurses in IVT practices. Knowledge on IVT was positively correlated with the nurses' level of educational qualification. Based on the results, it is recommended that nursing institutions put the necessary measures in place to ensure that nursing students are proficient in IVT administration prior to their graduation. Further research is needed to investigate the impact of educational qualifications on IVT-related patient outcomes. Future observational studies on the practices of nurses could also help in assessing nurses' practical competency in IVT.

Acknowledgments

The authors would like to express sincere gratitude to the Ministry of Health and Social Services for granting the permission to conduct the study. Equally the authors would like to thank all the nurses who took time to participate in this study.

Authors' Contributions

LNK and NT contributed to conceptualization, methodology, investigation, and formal analysis. NT was involved in supervision, validation, writing original draft, writing review, and editing. Both the authors approved the final version to be published.

Availability of Data and Materials

The datasets used and/or analyzed during the current study are available from the corresponding author on request.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.


Ethical Considerations

The study respondents provided written informed consent before their participation. The study was approved by the School of Nursing and Public Health, Ethical Committee (ref no: SoNEC 34/2022). The Ministry of Health and Social Services (ref no: 13/3/3/LNK001) also ensured that ethical considerations were met. The researchers were further guided by core ethical principles, namely respect for persons, beneficence, and justice, which are all rooted in the imperative to safeguard human rights during the research process (Brink et al., 2018). The individuals participating in the study were asked to provide written consent by selecting the “agreement button” in the hyperlink before they were allowed to proceed to the research questions. Respondents were able to complete the survey in the comfort of their homes, thereby ensuring their privacy. Participation was entirely voluntary and no personal identification data were required, thus ensuring complete confidentiality and anonymity. The electronic data collected were only accessible to the researchers. This study upheld the principles of the revised Declaration of Helsinki.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

ORCID iD

Nestor Tomas  <https://orcid.org/0000-0002-4769-2724>

Supplemental Material

Supplemental material for this article is available online.

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