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KNOWLEDGE AND PRACTICE ON BLOOD TRANSFUSION AMONG STAFF NURSES IN A SELECTED PRIVATE MEDICAL CENTRE, KLANG VALLEY

Nadira Amalina Azizan, Yee Bit-Lian, Rosnida Abu Bakar

Open University Malaysia, Faculty of Technology and Health Sciences, Kuala Lumpur, Malaysia.

ABSTRACT

Blood transfusion stands as a critical therapeutic measure applicable in a spectrum of medical situations, addressing bleeding disorders, accidents, surgeries, hematological diseases, and malignancies. The pivotal role of nurses in ensuring the safe and effective administration of blood transfusions cannot be overstated, particularly in minimizing the potential risks linked to transfusion reactions. This study is designed to assess the knowledge and practices of staff nurses at a designated medical center regarding the intricacies of blood transfusion administration. A hospital-based non-probability sampling method involved the distribution of a validated questionnaire among 80 staff nurses across specialized units and general wards. The objective was to comprehensively evaluate their knowledge and practices associated with blood transfusion. Statistical analyses, executed using SPSS software (version 25), included Cross Tabulation tests to scrutinize disparities in knowledge between general ward and specialized unit nurses. While the findings revealed satisfactory knowledge among staff nurses at the selected medical center concerning the blood transfusion process, deficiencies surfaced in their ability to handle complications and undertake related management. Notably, substantial differences in knowledge about blood

transfusion were discerned between nurses in specialized units and those in general wards. This suggests an overall knowledge deficit among staff nurses, with noticeable variations across different working areas. The study underscores the imperative for targeted educational interventions aimed at augmenting nurses' comprehension and proficiency in administering blood transfusions. Such interventions hold the potential to bridge existing knowledge gaps, ensuring optimal patient outcomes and fostering a culture of safety in blood transfusion practices at the selected medical center.

Keywords: *Blood transfusion*, *Knowledge*, *Practice*, *Nurses*, *Private hospital*.

Corresponding author: Yee Bit-Lian can be contacted at yeebl@oum.edu.my

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1. INTRODUCTION

Blood transfusion, recognized for its life-saving potential, is a critical medical intervention (Betty et al., 2016; Hijji, Oweis, & Dabbour, 2012; Kavaklioglu, Dagci, & Oren, 2017). Nurses, integral to this process, play a vital role in ensuring therapeutic efficacy and minimizing risks (Kangas & Saarinen, 2016). Following a recent incident at a medical center, nurses' knowledge and practices in blood transfusion are under scrutiny. Nurses, from patient preparation to post-transfusion activities, are key contributors, emphasizing their importance in the entire process (Lim et al., 2016). Responsibilities include

understanding indications, preventing errors, guiding patients, detecting transfusion reactions, and proper documentation (Tavares et al., 2015; Laher & Patel, 2018; Macdougall et al., 2017).

Observations in a selected Klang Valley private medical center identified concerns, especially among junior nurses, regarding the transfusion of different blood products. Some exhibited uncertainty and relied on seniors, indicating potential knowledge gaps. Interviews revealed limited awareness of various blood products, posing risks. The lack of comprehensive knowledge, particularly among junior nurses, raised alarms about patient safety and treatment efficacy (Rao et al., 2013). Mistakes related to blood transfusion, occurring within and outside the blood bank, underscore the critical need for improved knowledge (Hijji et al., 2012; Kavaklioglu et al., 2017; Rudrappan, 2019). Given these concerns, the researcher proposes an investigation into the knowledge and practice of nurses at a selected medical center in blood transfusion. The study aims to document their current state, identifying areas for improvement to enhance patient safety and treatment quality. In a medical environment where errors can have serious consequences, understanding the knowledge that underpins therapeutic practices is essential. This study seeks to address observed deficiencies and contribute to improving the quality and safety of blood transfusion procedures at the selected private medical center, Klang Valley, Kuala Lumpur. It assesses the knowledge and practice of staff nurses, recognizing the importance of sound knowledge in optimizing therapeutic benefits.

2. REVIEW OF LITERATURE

Nurses, as primary healthcare providers, play a pivotal role in ensuring the safe administration of blood transfusions. Comprehensive knowledge of blood component usage, potential side effects, and appropriate care is essential for delivering safe and effective transfusion therapy (Aslani et al., 2010; Lim et al., 2016). Several studies worldwide have assessed nurses' knowledge and practices in blood transfusion. Aslani et al.'s (2010) study at Shahrekord University of Medical Science found nurses' knowledge to be average and insufficient, raising concerns about potential risks. Similarly, Hijji et al. (2012) in Jordan observed significant knowledge gaps, especially in patient preparation, indicating deficits in critical aspects of blood transfusion. In Malaysia, Lim et al. (2016) identified moderate knowledge among nurses at Hospital Pulau Pinang, suggesting a need for improved practices.

Contrasting findings were evident in Kavaklioglu et al.'s (2017) study in Istanbul, where 96% of staff demonstrated knowledge of blood transfusion reaction symptoms. However, Elhy and Kasemy's (2017) study in Egypt reported poor knowledge among nurses, posing potential threats to patient safety. Yesilbalkan et al.'s (2019) study in Turkey indicated a significant improvement in knowledge scores post-blood transfusion courses, emphasizing the need to address knowledge gaps. Despite global studies, the scarcity of research on nurses' knowledge and practices in blood transfusion in Malaysia prompted this investigation at a selected private medical center in Klang Valley, Kuala Lumpur.

3. RESEARCH METHODOLOGY

3.1 Sample Size

This research exclusively included full-time Malaysian Registered Nurses employed in a specific private medical center, directly involved in in-patient care. This choice was based on their extensive exposure and expertise in managing blood transfusions, making them ideal candidates for evaluating knowledge and practices in this area. To ensure data accuracy, nurse managers, charge nurses, nurse educators, and newly registered nurses in the probation and orientation period were excluded. Using Raosoft sample size calculator, 120 staff nurses from specialized units and general wards were chosen for the study at a 95% confidence level.

3.2 Research Instrument

In this research, a validated questionnaire was employed, drawing questions from studies by Hijji et al. (2012), Lim et al. (2016), and Tetteh (2015). Questions were chosen to align with the clinical policies and settings of the selected private medical center. The questionnaire, divided into three sections, aimed to assess staff nurses' knowledge and its impact on blood transfusion practices. Section 1 covered participants' demographic data, Section 2 involved a Likert Scale questionnaire with 36 questions on knowledge and practices, while Section 3 comprised 10 dichotomous questions on complications and management related to blood transfusion. Completing the questionnaire was estimated to take 15–20 minutes.

3.3 Pilot Study, Reliability and Validity

To authenticate the study instrument, two panels of experts reviewed the questionnaire. Following the review, both panels affirmed the questionnaire's relevance for assessing staff nurses' knowledge of blood transfusion. Reliability was ensured through a pilot study at the selected medical center, involving a minimum of 10 staff nurses as a representation of the entire population. The study revealed alpha values of .933 for Section B and .617 for Section C (Complications and Management Related to Blood Transfusion). Nurses in the pilot study were excluded from the main study.

Table 1. Alpha value for Section B and Section C

Section	Cronbach Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Section B (Patient preparation before Transfusion)	.889	.910	11
Section B (Blood Pack Collection)	.869	.928	7
Section B (Blood Transfusion Nursing Activities and Issues)	.851	.915	16
Alpha value for a total of 36 items in Section B	*.933*	*.963*	*36*
Section C (Complication and Management Related to Blood Transfusion)	.617	.576	10

3.4 Ethical Consideration

We sought permission from the Open University Malaysia (OUM) Ethical Committee to conduct this research project. Subsequently, permission to conduct the pilot and the main study was obtained from the Human Resources Department via the Director of Nursing. Explanation given to the participants and their participation in this study was voluntary. The participants had the right to withdraw from the study before they submitted their questionnaires. A consent form was attached to the questionnaire and the privacy of the participants was maintained as confidential.

4. RESULTS

4.1 Demographic Data

At the chosen private medical center, the majority of nurses, 40.5%, are aged between 27-30 years, while a smaller percentage, 10.1%, falls within 24-26 years. Educational qualifications reveal that a significant 78.8% (n=63) possess a Diploma in Nursing, with only 21.3% (n=17) holding a Bachelor in Nursing. Work experience distribution shows that the largest portion, 36.3% (n=29), consists of junior intermediate nurses with 3-7 years of tenure, followed by senior intermediate nurses at 26.3% (n=21), junior nurses at 25.0% (n=20), and senior nurses at 12.5% (n=10). In terms of departmental allocation, 56.3% (n=45) work in general wards, and 43.8% (n=35) in specialized units out of the total 80 participants. Concerning blood transfusion administration in the last six months, 31.3% (n=25) did not administer any, 30.0% (n=24) administered 1-3 transfusions, 25.0% (n=20) administered 4-6,

and only 13.8% (n=11) administered 7-10. Regarding awareness of the hospital's written policy, 91.1% (n=72) were aware. Additionally, 7.6% (n=6) were unsure if such a policy existed. Regarding participation in educational programs, 67.5% (n=54) claimed participation in any blood transfusion-related program in the last six months. However, 40.8% (n=31) and 13.2% (n=10) claimed participation in such programs less than 2 times and 3-5 times, respectively.

4.2 Knowledge and Practice of Blood Transfusion Process

The key findings in the four phases of blood transfusion are noteworthy. Regarding the initiation phase, 96.3% of participants (n=77) ensure that blood transfusion requests are processed through the Health Management Information System (HMIS) prior to transfusion. Additionally, the study highlights the significant understanding among nurses regarding the necessity of obtaining informed consent before blood transfusion treatment, with 98.8% (n=79) ensuring the presence of informed consent. The awareness extends to the requirement for informed consent before blood product transfusion, as evidenced by 98.8% (n=79) agreement with the statement "I make sure there is informed consent prior to transfusion." In terms of patient history, 77.5% of participants strongly agreed with the statement "I check if the patient has any previous reaction to blood transfusion. Concerning specific actions during the blood transfusion process, a majority of participants (91.3%, n=73) expressed a positive stance on labeling patient blood samples at the bedside. Similarly, in the transportation phase, 92.4% (n=73) agreed with the statement

"I transport one blood from the blood bank to only one patient at a time," while 6.3% (n=5) remained neutral, and 1.3% (n=1) disagreed with the statement.

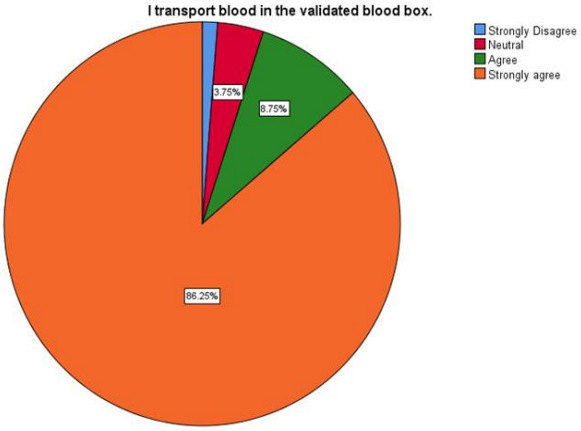

Figure 1. Analysis for item “I transport one blood from blood bank to only one patient at a time”

The study findings reveal a high level of agreement among participants, with 93.8% (n=75) strongly agreeing or agreeing with the statement. A significant majority, 89.8% (n=71), asserted their commitment to initiating blood transfusion within 30 minutes of removing the blood pack from the refrigerator and 2.5% (n=2) expressed disagreement. Among the dissenting opinions, one participant explained that delays were attributed to waiting for a medical officer to verify the blood, often exceeding the 30-minute threshold. Despite varied opinions on the aforementioned statement, an overwhelming majority, 95.0% (n=76), concurred that they would complete blood transfusions within four hours. Furthermore, 95.1% (n=76)

indicated their practice of inspecting blood bags for leaks, color, excessive air, and bubbles before transfusion. A robust 97.5% (n=78) ensured that blood bag tags, labels, and compatibility test results aligned with the patient's particulars on the blood form. Regarding patient identification, 97.4% (n=77) of participants confirmed checking details on both the blood transfusion form and patient wristband. In line with proper protocol, a majority, 78.8% (n=63), disagreed with the statement "I did not check patient case notes before giving blood transfusion," demonstrating their awareness of the need to review consultant orders before initiating treatment.

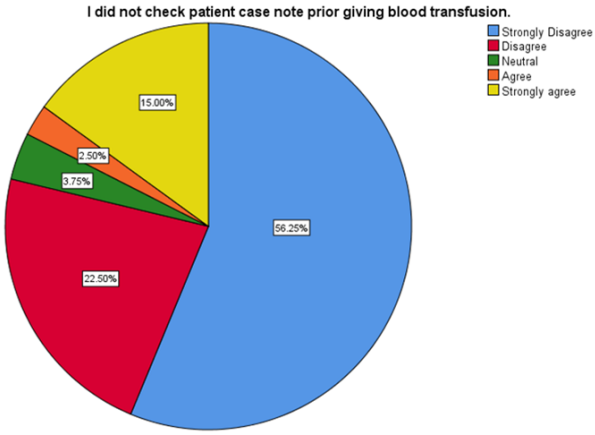

Figure 2. Analysis for item “I did not check patient case note prior to giving blood transfusion”

Additionally, participants demonstrate awareness of the need to closely monitor signs and symptoms of adverse reactions throughout the transfusion process, with a high agreement score of 96.3%. However, opinions diverge when it comes to

documenting patient SpO_2 during transfusion, as only 61.2% (n=49) agree not to record it, while 33.8% (n=27) disagree. Similarly, 60% (n=48) disagree with reducing the transfusion rate and closely monitoring patients when a transfusion reaction is suspected. Regarding communication, only 50.1% (n=40) agree to inform the patient's consultant if an adverse transfusion reaction occurs before stopping the transfusion, with 46.3% (n=37) dissenting. Concerning blood product handling, a substantial majority (77.5%, n=62) disagree with reusing any discontinued blood product before returning the blood bag to the lab. Conversely, 37.5% (n=30) agree to discard any remaining unused blood in the bag before returning it to the lab, while 52.6% (n=42) disagree with this practice. Finally, the majority (96.3%, n=77) express agreement with returning the blood pack, complete with the filled recipient card, to the lab after completing the transfusion.

4.3 Handlin the Complications and Management Related to Blood Transfusion

Regrettably, according to the key discovery in this study, a mere 60.8% (n=48) of the participants acknowledge that patient identification stands as the predominant cause of fatal transfusion reactions, while 39.2% (n=31) hold a dissenting viewpoint. It is disheartening to note that, based on the principal outcome of this research, only 60.8% (n=48) of the participants concur that patient identification is the leading factor contributing to fatal transfusion reactions, whereas 39.2% (n=31) express disagreement with this assertion. This study's significant revelation unveils that merely 60.8% (n=48) of the participants align with the notion that patient

identification constitutes the most prevalent cause of fatal transfusion reactions, contrasting with 39.2% (n=31) who dispute this claim. In essence, the major finding underscores the critical importance of patient identification in preventing adverse transfusion outcomes, highlighting a concerning level of disagreement among participants.

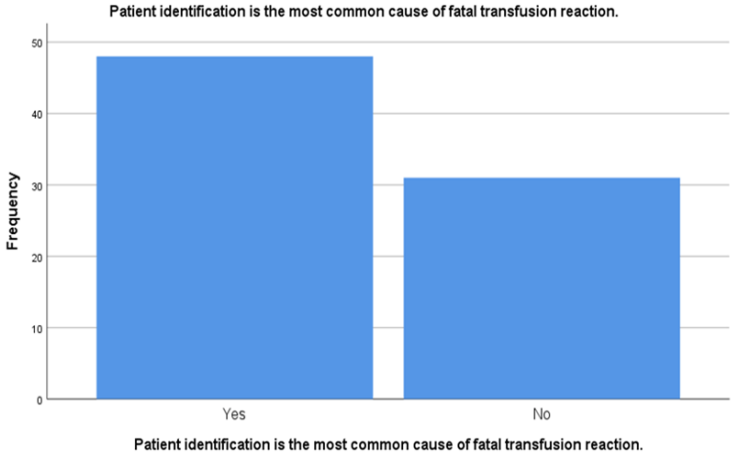

Figure 3. Analysis for item “Patient identification is the most common cause of fatal transfusion reaction”

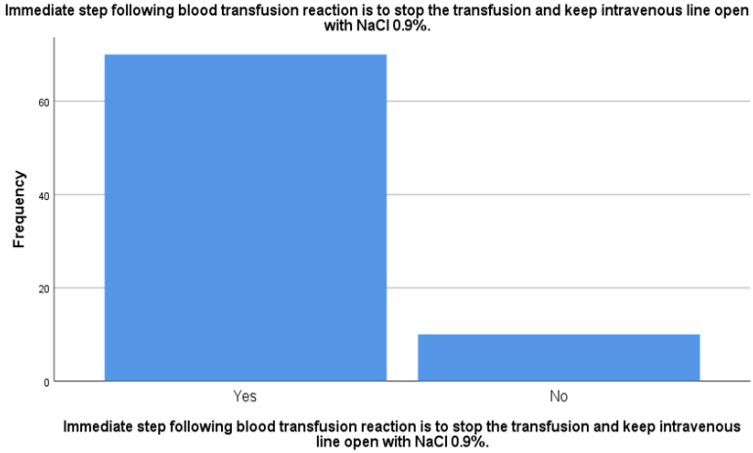

Figure 3. Analysis for item "Immediate step following blood transfusion reaction is to stop the transfusion and keep an intravenous line open with NaCl 0.9%."

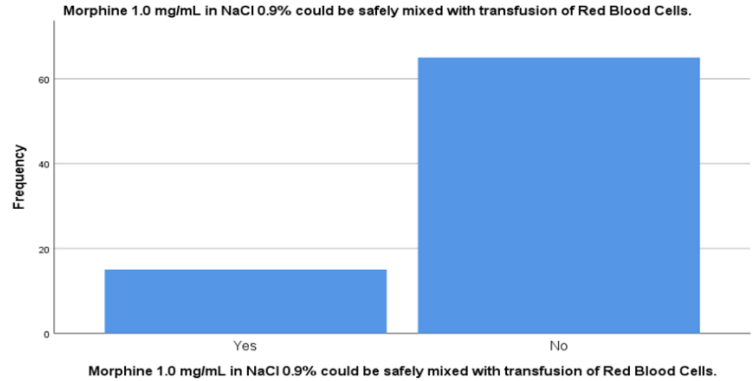

Figure 4. Analysis for item "Morphine 1.0 mg/mL in NaCl 0.9% could be safely mixed with transfusion of Red Blood Cells"

4.4 Differences in knowledge of blood transfusion between nurses according to their working area

This investigation, involving 80 participants, brought to light that 43.8% (n=35) were affiliated with specialized units, while 56.3% (n=45) hailed from general wards. Participants from specialized units unanimously endorsed (100%) ensuring the completion of blood transfusion requests before treatment. In general wards, 43 participants concurred. All participants from specialized units (100%) acknowledged the necessity of obtaining informed consent before transfusion. Regarding checking for previous transfusion reactions, 88.9% (n=40) in general wards and all participants (100%) in specialized units affirmed this practice. Concerning obtaining new blood samples for grouping and cross-matching, 73.3% (n=33) in specialized units and 93.3% (n=42) in general wards endorsed the procedure. After obtaining samples, 91.4% (n=32) in specialized units labeled at the bedside, whereas in general wards, 95.2% (n=41) agreed.

Specialized unit participants (94.3%, n=33) overwhelmingly prioritized compatibility tests before blood collection, while 93.3% (n=42) in general wards agreed. Concerning blood product transportation, participants from general wards scored higher on statements regarding using validated blood boxes and transporting one blood unit at a time compared to those from specialized units. The majority from both specialized units and general wards checked blood components and patient details with Medical Laboratory Technologists (MLT), with only one participant from the general ward dissenting. All specialized unit participants consistently inspected blood bags for leaks, color,

air, and bubbles (100%), while in general wards, 91.1% (n=41) did the same. All participants from specialized units were aware of the need to ensure blood bag tag, label, and compatibility test alignment with patient particulars, compared to 95.6% (n=43) in general wards.

Concerning patient identification, 94.3% (n=33) in specialized units and 95.6% (n=43) in general wards checked details on blood transfusion forms and patient wristbands before transfusion. While 74.3% (n=26) in specialized units agreed to check patient case notes, 74.3% (n=37) in general wards concurred. Regarding assessing blood bag expiration dates, 94.3% (n=33) in specialized units adhered to the practice, compared to 93.3% (n=42) in general wards. During the transfusion, specialized units (71.4%, n=25) demonstrated reluctance to include SpO2 in patient vital parameters, while in general wards, 62.2% (n=25) omitted this parameter. However, 28.6% (n=10) in specialized units and 37.8% (n=17) in general wards documented patient SpO2 with other vital parameters. When suspected transfusion reactions occurred, 74.3% (n=26) in specialized units reduced transfusion rates and closely monitored patients, while 31.1% (n=14) in general wards adopted the same practice. Informed patient consultants in case of adverse reactions before stopping transfusions were reported by 57.1% (n=20) in specialized units and 44.4% (n=20) in general wards.

Post-transfusion practices revealed that 17.1% (n=6) in specialized units and 24.4% (n=11) in general wards reused discontinued blood products, while 28.6% (n=10) in specialized units and 44.4% (n=20) in general wards discarded unused

blood before returning it to the lab. Concerning fatal transfusion reactions, 85.7% (n=30) in general wards identified patient identification as the main cause, whereas only 42.9% (n=15) in specialized units agreed. Disagreements emerged in recognizing symptoms of transfusion reactions, with 88.9% (n=4) in general wards and 94.3% (n=2) in specialized units. Most participants, 88.6% (n=31) in specialized units and 86.7% (n=39) in general wards opted to stop blood transfusions and maintain open intravenous lines with NaCl 0.9% following a reaction.

Discrepancies were observed on the allowable time for one unit of Red Blood Cells, with 40.9% (n=18) in general wards and 25.7% (n=9) in specialized units agreeing to 5 hours. However, bacterial contamination risk due to prolonged transfusion was recognized by 71.4% (n=25) in specialized units and 68.9% (n=31) in general wards. Opinions diverged on the statement that Morphine 1.0 mg/mL in NaCl 0.9% could be safely mixed with Red Blood cell transfusion, with 77.1% (n=27) in specialized units and 84.4% (n=38) in general wards expressing disagreement.

5. DISCUSSION

5.1 Knowledge and Practice of Blood Transfusion Process

The present study revealed that staff nurses at the selected private medical center possess satisfactory knowledge of the blood transfusion process, as indicated by mean scores exceeding 4.00 for all four phases. According to Eléonore (2017), it is imperative to communicate the risks and benefits of transfusion treatment to patients before commencing any procedure. The majority of participants in our study

demonstrated awareness of this requirement, with 98.8% (m=4.86) acknowledging the need for informed consent and 96.3% (m=4.75) recognizing the necessity of a valid consultant order before initiating blood transfusion treatment. Consistent with Mortell's (2019) assertion, our findings support the idea that verifying the validity of consent and consultant orders is crucial to prevent mis-transfusion incidents.

In the context of blood compatibility, Eléonore (2017) emphasized that administering incompatible ABO blood is a common cause of death after transfusion. Mortell (2019) also underscored the importance of ensuring compatibility between patient and donor blood groups and Rh factors. In our study, 93.8% (m=4.69) of participants indicated that they prioritize conducting compatibility tests before collecting blood, demonstrating their understanding of the significance of this step in preventing complications during transfusion. Patient identification emerged as a critical factor, with 97.6% of participants (m=4.76) recognizing its importance before any transfusion procedure. Mortell (2019) emphasized the verification of patient full name and medical record number to ensure accuracy. Proper bedside patient identification was deemed essential to prevent new errors, including mistransfusion, which could lead to patient mortality and morbidity (Hijji et al., 2012). Notably, our findings diverge from those of Hijji et al. (2012), who reported that only 30% of nurses considered patient identification as the most crucial step before transfusion.

Comparatively, our study aligns with Kavaklioglu et al. (2017), demonstrating an above-average knowledge level among

healthcare professionals on blood transfusion. Additionally, the results are consistent with Cherem et al. (2017), indicating that nurses generally possess satisfactory knowledge about the transfusion process. However, our findings contrast with those of Hijji et al. (2012) and Kabinda et al. (2014), which identified serious knowledge deficits in blood transfusion processes among staff nurses.

5.2 Handlin the Complications and Management Related to Blood Transfusion

This investigation revealed that staff nurses at the selected private medical center lack competence in the blood transfusion process and exhibit insufficient knowledge in handling complications and managing issues related to blood transfusion. This outcome aligns with Aslani et al.'s (2010) study, which similarly reported that nurses' knowledge about blood, indications, and complications of blood transfusion was rated as average and inadequate. According to Kavaklioglu et al. (2017), immediate signs of adverse transfusion reactions include fever, chills, shivering, nausea, vomiting, tachycardia, dyspnea, cyanosis, low back pain, chest pain, urticaria, erythema, burning sensation along the transfused vein, headache, dizziness, and hypotension. Hijji et al. (2012) noted that acute transfusion reactions may occur in 1% to 2% of patients receiving transfusions and can be fatal.

The current study found that 96.3% of participants closely monitor patients for signs and symptoms of adverse reactions, but only 33.8% document vital parameters, including patient SpO2, throughout the transfusion process. Monitoring patients before, during, and after transfusion is crucial, with direct

observation recommended for the first 15 minutes and subsequent checks at 15-minute intervals to promptly recognize harmful transfusion reactions (Eléonore, 2017; Kavaklioglu et al., 2017). Therefore, accurate and detailed documentation plays a pivotal role in the early detection of transfusion reactions. Among the participants, 92.4% were aware that chills, diaphoresis, muscle aches, back pain, and rashes are immediate signs of transfusion reactions. However, in the event of an adverse reaction, 50.1% of participants would inform the consulting in-charge before stopping the transfusion, rather than terminating it immediately. This finding contrasts with Kavaklioglu et al.'s (2017) study, where 99.0% of participants would promptly cease blood transfusions in response to a transfusion reaction.

5.3 Different in knowledge of blood transfusion between nurses according to their working area

In our investigation, discernible variations in blood transfusion knowledge were observed between nurses in general wards and those in specialized units. The study revealed that 55.0% of participants from general wards ensured the acquisition of informed consent before transfusion, while only 43.75% of participants from specialized units concurred with this practice. Additionally, 51.25% of general ward participants label patient blood samples at the bedside, compared to 46.25% in specialized units. Bedside labeling is crucial for ensuring the correct blood is matched with the corresponding patient, thus reducing the risk of adverse reactions. Moreover, 52.5% of general ward participants agree to transfuse blood products within 4 hours, while only 42.5% of specialized unit participants

share this viewpoint. Kavaklioglu et al. (2017) highlighted the risk of bacterial growth and hemolysis with prolonged transfusions beyond 4 hours. Unfortunately, only 32.50% of specialized unit participants are aware of this risk, in contrast to 45.0% of general ward participants who demonstrate greater awareness. Additionally, 10.0% of specialized unit participants admit to not checking patient case notes before administering blood transfusions, whereas only 7.50% of general ward participants acknowledge such negligence. Furthermore, 18.99% of specialized unit participants are aware that patient misidentification is a leading cause of fatal transfusion reactions, compared to 41.77% of general ward participants with a higher awareness of this critical issue.

Mortell (2019) emphasized the importance of pre-transfusion checks, encompassing valid consent, patient identification (including name and medical registration number), and a valid consultant order specifying blood product details, dosage, route, and duration. The study exposes a notable knowledge deficit among specialized unit nurses compared to their counterparts in general wards, contrary to expectations. Specialized unit nurses are typically expected to possess extensive knowledge and critical thinking skills to care for patients requiring specialized attention. Given the life-saving nature of blood transfusions, it is disappointing that the outcomes fall below the researcher's expectations, emphasizing the need for comprehensive and targeted educational interventions.

6. CONCLUSION, RECOMMENDATIONS AND LIMITATIONS

Blood transfusion is an intricate and multifaceted process that involves various disciplines and stages. Verifying patient details prior to transfusion is crucial to minimize potential risks and mitigate the chances of errors, as mis-transfusion can lead to severe clinical consequences. This investigation revealed that the staff nurses at the chosen private medical center exhibit a deficiency in their understanding of blood transfusion. The findings of the present study also indicated variations in knowledge levels, with certain aspects being more proficiently grasped by nurses in general wards as opposed to those in specialized units. Nonetheless, the knowledge deficit observed across both groups could be addressed through targeted training initiatives. Hence, the implementation of ongoing education and training programs becomes imperative to enhance the knowledge of staff nurses, ensuring patient safety and reducing the likelihood of medical errors.

The present study underscores the imperative for ongoing education among staff nurses regarding blood transfusion, recommending continuous training through conferences and Continuous Nursing Education (CNE). It advocates for competency assessments, surveys, or observations to evaluate the educational program's impact. Additionally, self-initiative among staff nurses to pursue further studies is encouraged to enhance their knowledge of blood transfusion, crucial for preventing complications and ensuring patient safety. Future research should expand to include more private medical centers and general hospitals across Malaysia. The proposed approach

involves observational methods and pre- and post-test knowledge assessments to comprehensively understand the prevailing conditions in different departments.

The study acknowledges two limitations: a single-center focus with a small sample size and the absence of breakdowns for sub-specialized units due to the limited sample. Consequently, quantitative data methodology may not offer a thorough comprehension of knowledge and practices regarding blood transfusion, unlike qualitative data methodology. Thus, the findings cannot be generalized to populations in other private hospitals, either within or outside Malaysia.

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