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Knowledge of the Nursing Students regarding Cardiac Tamponade: A Cross-sectional Survey

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Abstract

Cardiac Tamponade is a hemodynamic emergency that requires timely recognition of the hallmark signs. It is a critical factor that sign and symptoms were identified to prevent cardiogenic shock and death. Despite the clinical urgency, insufficient studies have been found regarding the nursing students' knowledge about cardiac tamponade in most academic setting in Saudi Arabia. This study aimed to assess the level of knowledge regarding cardiac tamponade among nursing students and to determine the differences on the level of knowledge when grouped according to demographic characteristics. A quantitative descriptive cross-sectional survey design was employed. Using purposive convenience sampling, data were collected from 50 respondents. A self-constructed, expert-validated, 20-item multiple-choice questionnaire (Cronbach's $\alpha = 0.743$) covering cardiac tamponade definition, management, complications, and prevention was administered via Google Forms. Descriptive statistics, Kruskal-Wallis, Mann-Whitney U tests, and Chi-square analysis were performed using SPSS v23.0, with significance set at $p < 0.05$. Findings revealed that most of the respondents were knowledgeable (36%) while 12% were highly knowledgeable. Interestingly, 34% of the students demonstrate a low knowledge category. Among the 14 clinical indicators, the items untreated complication outcomes (74% correct), common causes (63%), and pharmacologic support (62%) obtained the highest percentage of correct answer. Variables such age, gender, marital status, academic level, religion, or previous diploma status does not significant influence the level of knowledge ($p > 0.05$). Overall, the nursing students possessed a moderate level of knowledge with regards to cardiac tamponade. Gaps in the knowledge were found on priority nursing diagnosis and nursing intervention. Demographic background such as prior educational background, did not significantly predict knowledge levels. These findings underscore an urgent need to strengthen nursing curricula through case-based learning, simulation-based training, and competency-focused clinical education to improve students' preparedness for managing cardiac emergencies and ensuring patient safety.

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Keywords: Cardiac Tamponade, Knowledge Assessment, Nursing Students, Nursing Education, Quantitative Study

1. Introduction

Cardiac tamponade is a serious and potentially life-threatening condition that happens when fluid builds up around the heart inside the pericardial sac. Normally, the pericardium contains a small amount of fluid (about 15–50 mL) that helps reduce friction as the heart beats. However, when extra fluid such as blood, pus, or fluid related to cancer accumulates in this space, it begins to press on the heart. Because the heart needs room to expand and fill with blood between beats, this pressure prevents it from filling properly. As a result, less blood is pumped out to the body, leading to a drop-in blood pressure and reduced oxygen delivery to vital organs. Interestingly, the speed at which the fluid collects is more important than the actual amount. A small amount of fluid that accumulates quickly can cause sudden collapse, while a larger amount that builds up slowly may produce symptoms more gradually. Patients often present with low blood pressure, swollen neck veins, muffled heart sounds, rapid heart rate, and a noticeable drop in blood pressure during inspiration.

Recognizing these warning signs early is critical, as untreated cardiac tamponade can rapidly progress to shock and even death (Vakamudi *et al*., 2021) [14]

Cardiac tamponade can develop for many different reasons. It may occur after chest trauma, such as a stab wound or blunt injury, where bleeding into the pericardial space happens quickly. In other cases, it develops as a complication of cancer, particularly lung or breast cancer, or certain blood cancers. Medical procedures involving the heart—such as cardiac surgery, pacemaker insertion, or catheter-based interventions—can also unintentionally lead to fluid accumulation. Identifying the underlying cause is therefore essential, not only to treat the emergency but also to prevent the condition from happening again. (Adler *et al*., 2021; Klein *et al*., 2023) [1, 8]

The diagnosis of cardiac tamponade begins with careful clinical assessment and is confirmed using imaging, especially transthoracic echocardiography. The main treatment is pericardiocentesis, a procedure in which a needle is used to drain the excess fluid and relieve pressure on the heart. In more complex or recurrent cases, surgery may be required. Alongside the procedure, patients need close monitoring, oxygen support, and treatment directed at the underlying cause. Recent advances in imaging and minimally invasive techniques between 2021 and 2026 have improved early detection and significantly enhanced patient outcomes. (AHA Scientific Statement, 2024; ESC Guidelines Update, 2025) [2, 4]

2. Research Methods

2.1. Study design

This study utilized a quantitative descriptive cross-sectional research design as it assesses the knowledge of the nursing students about cardiac tamponade.

2.2. Data collection methods

This study used a self-constructed questionnaire. This was developed based on reading and reviewing related literature. This research instrument was in multiple-choice type questions that consist of 2 main sections comprising of 20 questions. The first section identifies the demographic background of the nursing students such as Age, Gender, Religion, Marital Status, Level, And whether a previous degree holder. The last tackles the knowledge regarding cardiac tamponade, cardiac tamponade management, and its complications as well as the disease prevention. There were 20 MCQ question type wherein the level of knowledge was categorized according to their results as to: (20-16) Highly Knowledgeable; (15-11) Moderately Knowledgeable; (10-6) Knowledgeable; (5-1) Less Knowledgeable; (0-1) Not Knowledgeable.

In terms of validity, the said questionnaire was submitted to three experts on the topic for face and content validity. The validation of the study is completed. The researchers followed the suggestions and recommendation of the said professionals in cardiac tamponade before it was pretested. There were ten nursing students who will not be part of the actual study were involved in the said pretesting. These help to identify vagueness, clarity and understandability of the information stated. The questionnaire underwent internal consistency or reliability using Cronbach's Alpha. The result of the reliability is 0.743 after the validation of the study is completed.

2.3. Sample characteristics

This study focused on the nursing student's knowledge about cardiac tamponade. The study population of this study was the nursing students at Riyadh Elm University. They were selected using purposive convenience sampling technique. Under this method, the researchers combined purposive sampling, which selects participants based on set eligibility criteria relevant to the study, with convenience sampling, which relies on participants who are easily accessible. The sample was selected using purposive convenience sampling but all nursing students were chosen by the researchers after receiving their consent for participation. The 50 nursing students comprise the total number of samples of this study.

2.4. Eligibility Criteria

The inclusion criteria include nursing students in level 4, 5, 6, 7 and 8. Those level 1, 2, and 3 nursing students were not be included since they are not yet exposed to adult health nursing. Those with incomplete answer to the questionnaire and unwilling to participate will serve as the criterion for exclusion.

2.5. Survey Administration

Once the research instrument was approved, the researchers administered the link to the respondents to answer the research's gathering tool. The researcher used an online tool e.g., Google forms in order to gather the data needed by the researchers. This link was sent to the respondents once they consented to the study. This study was conducted from May 1, 2026 to November 30, 2026. Within a six months' time period, the researchers collect the data and provide multiple follow up to the respondents. In order to prevent multiple participation of the respondents, the researchers customize the template of the Google as to avoid multiple answers from a single respondent. On this customization of the template, the researchers minimize human error of data entry.

2.6. Study preparation

Beforehand starting the questionnaire, the investigators made sure that all essential forms and permission letters are secured. The investigators will also meet with their research supervisor to discuss about their research. This help to finalize their strategies before survey administration.

2.7. Statistical analysis

This study utilized the version 23.0 of the Statistical package for Social Sciences (SPSS) in order to process the data that will be collected. Descriptive statistics such as frequencies and percentages were used to display nominal categorical data, whereas weighted arithmetic means was used to display ordered categorical data. The independent t-test and linear regression were used to calculate the hypotheses. The significance threshold was set at 0.05.

2.8. Ethical consideration

After getting the informed consent from the REU Research Center and have approval from the Institutional Review Board (IRB) and following REU's IRB policies and procedures as well as the necessary documents, the researchers maintain anonymity and confidentiality of the data. The study participants have the freedom to withdraw at any time from the study without undue consequences.

3. Results and Findings

3.1. Quantitative Study Result

Table 1: Frequency Distribution of the Study Sample (N=50)

Variables	Categories	Frequency (n)	Percentage (%)
Age	Less than 20 years	9	18%
	20-23 years old	14	28%
	23-25 years old	13	26%
	Above 25 years old	9	18%
Gender	Male	12	24%
	Female	38	76%
Religion	Islam	50	100%
	Christianity	0	0%
Marital Status	Single	23	46%
	Married	22	44%
	Divorced	5	10%
Academic Level	4	8	16%
	5	3	6%
	6	6	12%
	7	9	18%
	8	24	48%
Previous Degree	Yes	34	68%
(Diploma)	No	16	32%

The table 1 above illustrates the demographic profile of a study involving 50 participants (N=50). Age dispersal shows a young adult cohort, with the largest concentration of participants aged 20–23 years (n = 14, 28%), which is followed by those aged 23–25 years (n = 13, 26%). Cumulatively, 18% of the sample is over the age of 25. It represents the mature student profile aligns with the sample's marital status, which discloses a near-equal split between single (n = 23, 46%) and married (n =22, 44%) applicants, although divorced individuals form a minor fraction (n = 5, 10%). On gender and religious distribution, a plain demographic variance is noticed in gender dispersal, about females include the overwhelming mainstream of the sample (n = 38, 76%), related to males (n = 12, 24%). Concerning religious affiliation, the example is entirely homogenous, with 100% of the participants (n = 50) identifying as Muslim.

About the demographic and academic composition of the sample yields numerous critical consequences for the interpretability and generalizability of the study. The total homogeneity of the sample regarding religion (100% Islam) and the prominent female illustration (76%) heavily recommends that this study was showed within a highly specific geopolitical or institutional framework. The distribution is characteristic of public or private universities in Muslim-majority regions (such as the Middle East or parts of Southeast Asia) or within specific academic tracks that historically experience high female enrollment, such as Nursing, Allied Health, or Education. Therefore, any empirical conclusions drawn from this dataset can be interpreted strictly within this socio-cultural context, as the outcomes may not be generalizable to secular, co-educational, or Western institutional settings.

Table 2: Level of Knowledge regarding Cardiac Tamponade as Perceived by the Nursing Students (N-50)

Knowledge Classification	Score Range	Frequency (n)	Percentage (%)
Highly Knowledgeable	12-14	9	18%
Moderately Knowledgeable	9-11	6	12%
Knowledgeable	6-8	18	36%
Less Knowledgeable	3-5	14	28%
Not Knowledgeable	0-2	3	6%
Total		50	100%

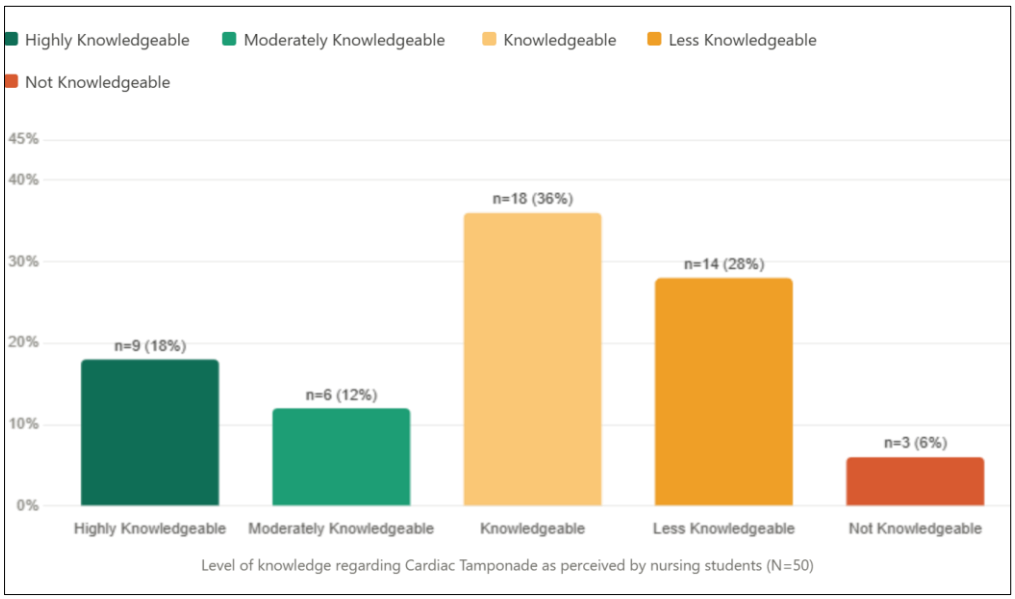
The table presents the frequency and percentage distribution of the respondents' level of knowledge about cardiac tamponade. About the data, it is categorized or divided into five distinct knowledge groupings found on the respondents achieved score ranges and out of a total sample size of 50 nursing students.

Based in Table 2, the highest percentage of respondents falls under the "Knowledgeable" category, accounting for 36% (n = 18) of the total population, with scores ranging from 6 to 8. The said table indicates that more than one-third of the nursing students have a fundamental consideration on cardiac tamponade. On the other hand, only a minor portion of the sample verified advanced proficiency. Definitely, 18% (n = 9) these were classified or known as "Highly Knowledgeable" (scores 12–14), and a mere 12% (n = 6) were deemed "Moderately Knowledgeable" (scores 9–11). But, taken all together, that only 30% of the respondents scored above the mid-point tier, giving a deficit in comprehensive, high-level mastery of the subject.

On a serious note, is the substantial cluster of respondents occupying the lower echelons of knowledge. It discloses that 28% (n = 14) of the nursing students are "Less Knowledgeable" (scores 3–5), although 6% (n =3) are characterized as "Not Knowledgeable" (scores 0–2). Collectively, 34%—more than one-third of the entire cohort—display deficient grasp of cardiac tamponade ideas or notions. The facts signify a highly fragmented distribution of comprehension across the cohort. Whereas the pluralistic

majority achieves a baseline "Knowledgeable" meaning or status, the segment of students who are significantly deficient (34%) outweighs those who possess advanced mastery (30%). This polarity advises that while the core curriculum succeeds in introducing the topic to most students, it fails to transition a critical portion of the population into a proficient level of understanding.

Cardiac tamponade is a high-acuity, life-threatening medical emergency categorized by the accumulation of fluid in the pericardial space, which restricts cardiac filling and drastically reduces cardiac output. About the clinical settings, the timely recognition of classic diagnostic indicators—such as Beck's Triad (hypotension, jugular venous distension, and muffled heart sounds)—is dominant. The information is 34% of impending nursing graduates had lack or has absence of satisfactory knowledge that implies a heightened risk of failure-to-rescue scenarios in clinical settings. If a third of entering practitioners cannot accurately identify or differentiate the clinical manifestations of cardiac tamponade, it poses a straight or direct risk to patient safety, possibly leading to late medical interventions, for example pericardiocentesis or increased mortality rates.



The figure above shows the knowledge distribution about cardiac tamponade. Based on the results, there is a dominance of the average perception where the knowledge consisting of 36% (18) was near to the less knowledgeable of 28% (n-14). Since there is heterogeneity of the knowledge regarding cardiac tamponade, this indicates that the nursing students does not have consensus in relation to their clinical competency.

Table 3: Itemized Frequency of Knowledge as per indicators (N=50)

Knowledge Indicators	Correct (N)	Correct (%)	Incorrect (N)	Incorrect (%)
Definition	25	49	25	51%
Common Result	32	64	18	36%
Classic Sign	26	51	24	49%
Common Cause	32	63	18	37%
Typical Symptom	21	42	29	58%
Most useful Diagnostic Test	28	56	22	44%
Immediate Medical treatment	28	56	22	44%
Priority Nursing Intervention	16	32	34	68%
Drug to Support Blood Pressure	31	62	19	38%
Priority Nursing Diagnosis	2	4	48	96%
Untreated Complication Outcome	37	74	13	26%
Serious Immediate Complication	28	56	22	44%
Preventive Measure	31	61	19	39%
Discharge Instruction	29	57	21	43%
Overall	28	55.4%	22	44.6%

This study reveals a moderate overall knowledge level regarding the assessed clinical indicators, with an overall mean of 55.4% correct responses (n=28). Whereas this clearly state a foundational understanding of the subject and the itemized analysis exposes critical disparities between theoretical knowledge and clinical application, presenting substantial consequences for professional practice and education.

It has the impact on the matter of patient safety on clinical decision making. The severe deficiency in identifying significance diagnoses (96% incorrect) and nursing interventions (68% incorrect) carries critical implications for patient safety. In clinical atmospheres, the inability to correctly prioritize care can go to failure-to-rescue scenarios, delayed interventions, and utmost deteriorated patient outcomes.

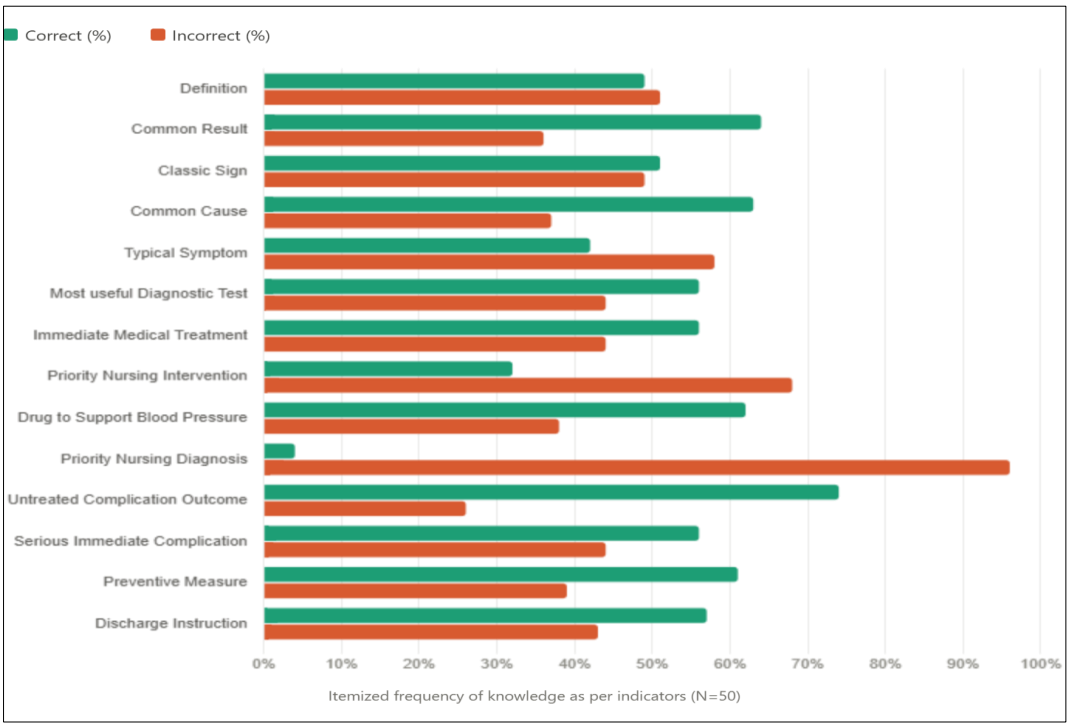


Fig 2: Itemized Assessment of Nursing Students' Knowledge of Cardiac Tamponade by Indicator (N=50)

The figure 2 illustrates the itemized assessment of nursing student's knowledge regarding cardiac tamponade based on each indicator. Based on the graph, nursing students were knowledgeable in the areas of untreated complication outcome, common cause and common result. Majority of them were incorrect in priority nursing diagnosis and priority nursing intervention. This implies that students at their formative phase should develop the theoretical and clinical competence which would help them to correctly identify the priority nursing diagnosis and intervention. Failure to identify those priorities resonates the need to understand the pathophysiology of the disease process to impact the better patient health outcomes.

Table 4: Difference on the Knowledge Scores across Demographic Characteristics

Variables	Category	M±SD	Non-Parametric test	Test Statistics	p-value	Interpretation
Age	Less than 20 years	9.50±6.36	Kruskal-Wallis	H=1.126	0.771	Not Significant
	20-23 years old	8.00±3.37				
	23-25 years old	6.64±3.04				
	Above 25 years old	7.39±3.69				
Gender	Male	5.00±2.00	Mann-Whitney U	H=4.165	0.125	Not Significant
	Female	8.25±3.63				
Religion	Islam	7.50±3.44	Kruskal-Wallis	H=4.165	0.125	Not Significant
	Christianity	14.0±0.00				
Marital Status	Single	7.86±3.64	Kruskal-Wallis	H=2.881	0.237	Not Significant
	Married	7.65±3.39				
	Divorced	5.00±2.92				
Academic Level	4	8.50±4.00	Kruskal-Wallis	H=1.888	0.756	Not Significant
	5	7.67±1.53				
	6	6.33±1.97				
	7	6.67±3.32				
	8	7.71±3.92				
Previous Degree	Yes	8.25±3.62	Mann-Whitney U	U=319.5	0.235	Not Significant
(Diploma)	No	7.12±3.44				

The table 4 outlines the inferential statistical analysis evaluating differences in knowledge scores across various demographic characteristics of the respondents. Based on the table, none of the measured demographic variables served as a predictor in the nursing student's knowledge scores. The knowledge of the sample remains homogenous which suggest that the demographic characteristics do not influence the level of knowledge regarding cardiac tamponade. On the other hand, the findings on demographic not serving as predictors results to the absence of predictive power. This means that the demographic of the nursing students does not have significant relationship with the outcome measured.

This finding of demographic which does not influence support the current knowledge gap that priority nursing intervention and nursing diagnosis is a widely social issue in healthcare. A pedagogical recommendation for the nursing students should be created such as simulation or case-based learning to understand the cardiac tamponade itself.

Table 5: Distribution of participants across knowledge levels across previous degree (Diploma)

Have a Previous Diploma?	Test-statistic	X^2	Degree of Freedom (df)	*p*-value	Decision Rule	Interpretation
No	Chi-square	1.976	2	0.372	Reject the Null	Not Significant
Yes						

This table express that the Chi-square (X^2) test of independence used to analyze the distribution of participants across knowledge levels based on their prior educational background (whether they hold a previous clinical diploma). Based on the table, there is no significant relationship between knowledge scores and prior degree. Since the p value is greater than the 0.05 level of significance, the null hypothesis was rejected. Thus, it is not statistically significant interpretation. Meanwhile, the distribution of knowledge levels (e.g., low, moderate, high) does not vary dependently based on a participant's prior diploma status. And those with diploma did not achieve an important different sharing or distribution of knowledge mastery compared to those entering with one. This infers that prior training does not influence the level of knowledge regarding cardiac tamponade.

3.2. Discussion

This study focused on the level of knowledge regarding cardiac tamponade of nursing students enrolled at Riyadh Elm University (n-50). The demographic composition a predominantly female, Muslim and substantially half of the respondents were advanced nursing level. These results are consistently with the sociodemographic characteristics of students studying in the GCC countries where majority of the individuals were Muslims. For Magnetaba (2025),[9] the nursing profession still considered to be the backbone of the healthcare. They are the essential workforce that comprised of women majority at around 89% that adapt to the societal needs. As to the age distribution, most of the student nurses under studied were in aged ranging from 20-25 years old. This indicates that most of the students are within late adolescence where accelerating the acquisition of knowledge is essential. As cited by Wood et.al., (2017),[15] the late adolescence to early adulthood is the start of becoming matured, self-sufficient and assume more roles and responsibilities and obtained the necessary education and training beneficial to their developmental years.

The majority of the respondents were knowledgeable with regards to cardiac tamponade where only eighteen percent were highly knowledgeable. This result carries a clinical significance. Cardiac tamponade is a hemodynamic emergency where a significant amount of fluid accumulates in the pericardial sac that limits filling and result to constrictive pressure and reduced stroke volume and cardiac output (Gopal, 2026).[5] The hallmark shows a Beck's Triad of hypotension, jugular venous distension, and muffled heart sounds which need immediate recognition by the nurse as delay can lead to cardiogenic shock and patient death (Imazio, 2018). [6] With having a one third not achieving a moderate knowledgeable level, it makes a concern in the aspect of patient's safety that may lead to measurable clinical consequences. This finding is consistent with previous studies showing nursing students deficits on cardiovascular emergencies. Similar to limited knowledge regarding heart failure self-management principles which emphasize the need for continuing education to enhance nursing competencies and improve patient health (Mazumder, 2025).[10]

The overall analysis across the 14 clinical domains found a 55.4% of correct response which indicate a moderate knowledge. With the fragmented indicators having knowledgeable level, this suggests a surface level awareness opportunities, simulation-based training, and clinical experiences to improve students' competence in recognizing on the clinical concepts and concerning in relation to patient safety and competence of the nurses. The current literature is aligned with this result, as previous study found a low to moderate level of knowledge and competencies on patient safety (Sümen, 2022). [13] According to the study of Rebeschi (2020), [12] the nursing students evaluated on self-perceived safety competencies which demonstrate that they gained confidence in patient safety higher in the skills laboratory. Further, the current findings found an acceptable performance in common cause and useful diagnostic test, this implies the etiology and diagnosis areas of the cardiac tamponade was taught with clarity with the course and that priority is necessary to address the etiology and recognition for the patient having this disease (Kim et al.,2021). [7] However, the dimension that needs to concentrate was in the clinical consequential deficit which is the nursing diagnosis and intervention. Identifying these areas on the art of the nurses can maintain patient's safety. These findings provide the knowledgeable gap between the knowledge on cardiac tamponade and translating what have been learned and put it in an actionable intervention for the patients. This result infers with Pitsillidou et al (2023) [11] which explained that limited access to nurse professional education, inconsistencies in nursing curriculum, inadequate healthcare resources and unavailable use of evidence-based protocol affect the level of implied competence of nurses. All of these limit the nurse's ability to provide optimal care for the patients.

The study hypothesis found no significant relationship between previous degree and the level of knowledge about cardiac tamponade. This indicates that student nurses educational background does not influence their knowledge about cardiac tamponade. Irrespective of their educational background, students possess similar level of knowledge. For Benner (1984),[3] knowledge to certain disease can be developed not from the prior educational background but through nursing education, clinical experience, and continuous training. This made prior educational background is not a predictor in the knowledge about cardiac tamponade. Finally, future research should have adequately powered on the study sample to establish a definitive difference or relationship in the knowledge regarding cardiac tamponade.

4. Conclusion

This study concluded that nursing students demonstrated a moderate level of knowledge about cardiac tamponade. They were reported to have adequate knowledge in the cardiac tamponade basic cause, causes and diagnostic procedure. Priority nursing diagnosis and nursing interventions were the two-dimension identified as the knowledge gaps that need to be addressed. Furthermore, demographic background,

including previous degree status, was not significantly associated with the level of knowledge regarding cardiac tamponade, suggesting that educational background alone does not influence students' understanding of the cardiac tamponade. Overall, the findings underscore the need for enhancing nursing education by implementing continuous learning and managing cardiac tamponade and ultimately promote patient safety and quality nursing care.

Recommendations

The following recommendations were drawn:

1. Continuous self-directed learning on the topic of cardiac tamponade and other clinical emergency should be designed to encourage students to engage on this critically significant activity.
2. Enhancing student's ability in nursing diagnosis and intervention should be actively implemented in order to strengthen the student's knowledge through clinical studies and simulation, and training opportunities.
3. Continuous evaluation of the nursing curriculum should be done to adequately covered the competencies need and address the ga among students
4. future researches should utilize a larger sample size should be done to improve the generalizability of the study
5. Other factors should be examined that influence the knowledge of the student nurses such as academic performance clinical exposure and learning objectives
6. Longitudinal studies should be performed to evaluate the effectiveness of educational intervention to improve the level of knowledge of the nursing students

Limitation of the study

This study utilized nursing students of a university only which limit the generalizability of the study findings. The number of the study sample was just 50 respondents which have a reduced powered in interpreting variables. The use of self-administered questionnaire is link to response bias which increase the risk of students may guess answer or give socially desirable response. Since this study is a form of cross-sectional research, this study failed to establish causal relationship. Lastly, the current study focused solely on knowledge about cardiac tamponade and not include the evaluation of performance or competency in managing the condition.

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