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RELATIONSHIP BETWEEN PATHOPHYSIOLOGY KNOWLEDGE AND PATIENT ASSESSMENT ACCURACY IN UNDERGRADUATE NURSING STUDENTS.

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ABSTRACT

Background: *Accurate patient assessment is a fundamental competency in nursing practice, often influenced by students' theoretical knowledge. Pathophysiology forms the scientific basis for clinical decision-making, and a clear understanding of disease mechanisms enables timely recognition of patient deterioration. However, gaps often exist between theoretical instruction and clinical application in undergraduate nursing education.*

Aim: *This study aimed to examine the relationship between pathophysiology knowledge and patient assessment accuracy among undergraduate nursing students in Swat, Pakistan.*

Methods: *A quantitative, cross-sectional design was employed. A total of 270 final-year nursing students were selected using stratified random sampling. Data were collected through a structured questionnaire comprising 20 multiple-choice questions on pathophysiology and 10 clinical scenarios assessing patient assessment accuracy. Statistical analysis was performed using SPSS version 26, including descriptive statistics and Pearson's correlation.*

Results: *The mean score for pathophysiology knowledge was 13.8 (SD = 2.7), while the mean patient assessment score was 7.2 (SD = 1.9). Out of 270 participants, 58.5% scored ≥70% in pathophysiology, and 53.3% scored ≥70% in assessment accuracy. A strong positive correlation ($r = 0.68$, $p < 0.001$) was found between pathophysiology knowledge and patient assessment accuracy, indicating that higher theoretical understanding was associated with better clinical judgment.*

Conclusion: *The study concluded that pathophysiology knowledge significantly influences the accuracy of patient assessment. Integrating theoretical instruction with clinical training is essential for enhancing nursing students' competence and ensuring patient safety.*

Keywords: *Pathophysiology, Patient Assessment, Nursing Students, Clinical Accuracy, Nursing Education, Correlation, Undergraduate Nursing.*

INTRODUCTION

Pathophysiology refers to the study of disharmonic physiological processes that give rise to, constitute, or are in some other way related to a disease or injury (Guest, et al., 2022). Patient assessment accuracy is the term used to describe the performance of the work with the clinical signs, symptoms, and diagnostic results in case of healthcare setting. The

importance of developing the ability to assess patients correctly cannot be overestimated in nursing education, and clinical reasoning and critical thinking will be advanced with the knowledge of the underlying pathophysiology (Cook et al., 2022). Good understanding of the pathophysiological concepts enables nursing students to connect consensual concepts to actual patient cases to eventually aid in decision-making process (Alsunni & Rafique, 2021).

There is continuing growth in the world demand for well-trained nurses who are keen on diagnostic skills, especially because of the complexity of patient care. The survey conducted in the United States demonstrated that new nurses freshly graduated claim that they have trouble making a correct clinical assessment in the first year of work to be about 65 % (Shatto & Meyer, 2024). Low- and middle-income countries also report a similar issue, as lack of clinical exposure results in low performance of students in assessing the accuracy of assessments (Meghji et al., 2021). A 2025 study conducted in South Africa demonstrated that more than 40% of final-year nursing students were unable to interpret abnormal vital signs, and the major reason behind this is the lack of sufficient understanding of pathophysiology (Iqbal, et al., 2025). This result highlights the necessity to study the correlation between prior knowledge and performance on assessments.

A presentation of pathophysiology learning content into the nursing student clinical education is deemed as facilitating in developing diagnostic reasoning in nursing students. Teachers support the need to explain the mechanisms of clinical symptoms to learners because such students are more prepared to make meaningful assessments (Smith, et a., 2022). Learning how diseases run their course can be helpful in recognizing the early onset symptoms, reading laboratory results, and setting priorities in interventions. In the absence of this insight, students can refer to such superficial clues, which raises the likelihood of misdiagnosis and late treatment (Pratiwi, et al., 2024). Integrative approaches to theory and practice are thus essential in the nursing education.

There are a number of studies trying to address the relationship between the academic achievements in pathophysiology and clinical competency. An example is the study by Hussain et al. (2025) where they discovered that the enhancement of applied clinical knowledge is achieved through incorporation of theoretical training. Next, Fernandez et al. (2021) underlined the power of the web-based formative assessment based on clinical cases in supporting the pathophysiological knowledge. This kind of intervention helps to improve the recognition of the worsening conditions and Patient assessment improved.

Regardless of the evidence, most undergraduate nursing programs are still characterized by very high rates of shortcomings in the ability of students to bring classroom knowledge and apply it at the bedside. One of the reasons is the lack of parallels between the foundational courses and the clinical practice modules (Amend & Peters, 2021). Pathophysiology is one of the subjects that students mostly learn in a vacuum, without practicing them, or being exposed to simulated or real-life patient cases (Guest, 2021). This educational vacuum negatively affects the formation of a holistic clinical image by them, as well as interferes with assessment accuracy and confidence.

Use of simulation in education has developed as a potential method of dealing with such challenges. Pathophysiological reasoning practiced through a simulated patient encounter together with pathophysiological reasoning has been demonstrated to improve diagnostic accuracy and foster the process of reflection (Osman et al., 2025). Moreover, analytical thinking and decision-making are stimulated by the use of structured clinical assessment tools that are enriched with pathophysiological prompts among learners (Fernandez et al., 2021). These discoveries substantiate the applicability of pathophysiology in practice and build competence in nursing.

Methodology

The quantitative, cross-sectional research design was embraced to explore the correlation that exists between the knowledge of pathophysiology and the accuracy of assessment made by undergraduate students of nursing. This design allowed the measurement of the two variables at a similar point in time by use of structured assessment tools.

It was carried out in different nursing Colleges that are found in Swat District of the Khyber Pakhtunkhwa or Pakistan. The people in the target

group included 900 final-year undergraduate nursing students in these institutions. The sample size calculator by Raosoft was used to arrive at the required sample size based on 95 percent confidence level, 5 % error margins and 50 % distribution of respondence. A minimum sample size of 270 participants was established. There was a stratified random sampling that included proportional representation according to each college. All the participants would take part voluntarily and all signed the consent form before taking part in the data collection.

Data Collection Procedure

The collection of data was done in the classrooms in the colleges chosen in Swat. The participants were gathered in controlled meetings during which the questionnaire was distributed. The assessment was to take 45 minutes per student. They were asked not to refer to any study related materials or study together or consult fellow students during the session. The study was done under the direct supervision of the researcher and an assistant in maintaining the integrity and standardization of the data.

The main tool of data collection was a structured questionnaire. It was composed of three parts: demographic data, 20-item multiple-choice test on pathophysiology, and a checklist of clinical scenario with accurate assessment of patients. The content validity was ensured with expert review by nursing educators. It had a pilot test done with 30 students which were not part of the final sample. Reliability analysis based on Cronbach alpha gave a value of 0.81 indicating internal consistency.

Data Analysis Procedure

Data obtained were coded and executed in SPSS version 26. Demographic and academic variables were summarized using descriptive statistics; b) Mean, standard deviation, and frequencies were used to get a summary of demographic variables describing the participants and underlying academic variables used in the study. The coefficient value obtained by Pearson determined the relationship measure and direction of correlation between the students with better pathophysiology concepts and the correct evaluation of the patient. A statistical significance was assumed in the presence of the p-value of less than 0.05.

Results and Analysis

Demographic Characteristics of Participants

The majority of participants were male, accounting for 78.5%, while females comprised 21.5% of the sample. Most students were aged between 20–22 years (54.8%), followed by those aged 23–25 years (35.2%) and 26 years and above (10.0%). Regarding academic level, 35.6% were in the 3rd semester, while both 5th and 7th semester students each represented 32.2% of the total. This shows a fairly even distribution across academic levels. Male dominance and a younger age group were more prominent in the sample [Table 1].

Table 1: Demographic Characteristics of Participants (n = 270)

Variable	Frequency (n)	Percentage (%)
Gender		
Male	212	78.5%
Female	58	21.5%
Age Group		
20–22 years	148	54.8%
23–25 years	95	35.2%
26 years and above	27	10.0%
Semester		
3th Semester	96	35.6%
5th Semester	87	32.2%
7th Semester	87	32.2%

The pathophysiology knowledge test comprised 20 items, with participants achieving a mean score of 13.8 and a standard deviation of 2.7. Scores ranged from a minimum of 7 to a maximum of 20, indicating varied levels of understanding. A total of 158 students, representing 58.5% of the sample, scored 70% or above. This suggests that more than half of the students demonstrated a satisfactory grasp of pathophysiological concepts. However, the variation in scores points to potential knowledge gaps among a significant minority [Table 2].

Table 2: Descriptive Statistics of Pathophysiology Knowledge Test (n = 270)

Statistic	Value
Number of Items	20
Mean Score	13.8
Standard Deviation	2.7
Minimum Score	7
Maximum Score	20
Students Scoring ≥ 70%	158 (58.5%)

The patient assessment section included 10 clinical scenarios, with a mean score of 7.2 and a standard deviation of 1.9. Participant scores ranged from 3 to a perfect score of 10. A total of 144 students, representing 53.3% of the sample, achieved an accuracy rate of 70% or higher. This indicates that slightly over half of the students demonstrated adequate clinical assessment skills. The results reflect a moderate performance level, with room for improvement in diagnostic accuracy [Table 3].

Table 3: Descriptive Statistics of Patient Assessment Accuracy (n = 270)

Statistic	Value
Number of Assessment Items	10 scenarios
Mean Score	7.2
Standard Deviation	1.9
Minimum Score	3
Maximum Score	10
Students Scoring ≥ 70% Accuracy	144 (53.3%)

The below figure highlights that student with higher knowledge scores (≥70%) are significantly more likely to achieve high assessment accuracy [Figure 1].

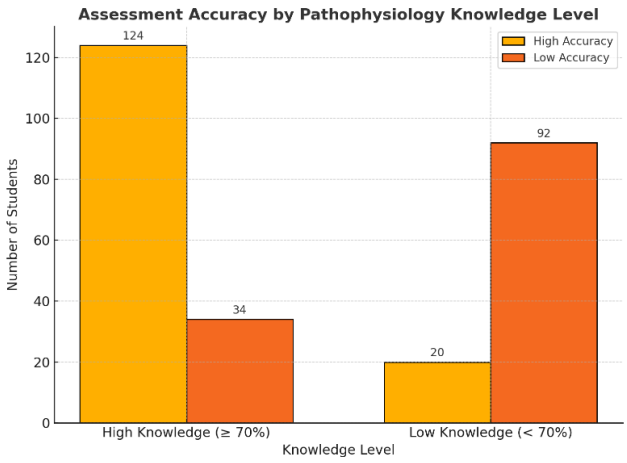

Figure 1: Knowledge Level and Assessment Accuracy

The correlation analysis revealed an r-value of 0.68 between pathophysiology knowledge scores and patient assessment accuracy scores, with a p-value of < 0.001. This indicates a strong positive and statistically significant relationship between the two variables. Students with higher knowledge in pathophysiology were more likely to perform accurate patient assessments. The findings suggest that improving theoretical understanding directly enhances clinical decision-making abilities [Table 4].

Table 4: Correlation Between Pathophysiology Knowledge and Assessment Accuracy

Variables	r-value	p-value	Interpretation
Pathophysiology Knowledge Score			
Patient Assessment Accuracy Score	0.68	< 0.001	Strong positive correlation

Discussion

This research inquiry indicated that there is a significant association between pathophysiology knowledge and patient assessment accuracy in an undergraduate nursing sample of students that are highly significant. The correlation coefficient stands at 0.68; the p-value (0.001) indicates that the results imply that students who seek to have a good grasp of the concepts of pathophysiology will have a better chance of making the correct interpretation of clinical signs and symptoms. It lends credence to the theoretical foundation of cognitive knowledge in the field of biomedical sciences that complements clinical reasoning in nursing education (Hunter & Arthur, 2022). It is consistent with other studies conducted by Franklin and Melville (2021) that found that learners who had better performance in assessment tasks on pathophysiology had more appropriate diagnostic decision making in simulation tasks.

In this research, 58.5 percent of the students received a score of 70 percent or above in pathophysiology knowledge test whereas 53.3 percent scored over 70 percent on accuracy test on patient assessment. These outcomes show that the level of their proficiency is moderate, and a significant part of the sample has to enhance their skills in the two directions. This fact reverberates with the findings of Harrison et al. (2021), according to whom, a significant amount of undergraduate nursing students cannot properly transfer theoretical knowledge to the clinical space. Nevertheless, the results are quite higher as compared to the study conducted by Chen et al. (2020) who obtained a lower average of only 42 percent accuracy in the clinical judgment of nursing students (Guest, 2021).

In light of the above-mentioned findings compared to those of Oermann et al. (2021), who put a particular focus on simulation and reflective processes of debriefing as the means of achieving the awareness of proper assessment, the participants of this study may have been exposed to active learning strategies, which helps to bridge the gap between theory and practice. The use of simulation techniques, such as the ones analyzed by Reinkemeyer, Chrisman, and Patel (2022), have also specifically come in handy to develop the ability to be critically diagnostic in learners. The better performance observed here can also be attributed to the case-based learning focus observed in a number of nursing colleges in Nigeria. By contrast, types of studies in environments where formats that are based on passive lectures predominate, including that described by Zarandi et al. (2023) will tend to reveal less strong correlations between knowledge and practice, typically revealing more surface-level memorization seen among students

Even though the performance has been good, the results are also indicative of the fact that almost half of the students were achieving less than 70 % on pathophysiology or assessment accuracy. The same can be compared to the arguments presented by Ignatavicius et al. (2021) stating that the foundational knowledge should be emphasized constantly during the nursing course and not front-loaded in the first semesters. The weak capacity of remembering and implementing complex mechanisms of diseases beyond time can be one of the explained reasons why the moderate correspondence is observed in this research. This is seemingly of vital importance with regard to long-term maintenance of competency because of

consistent reinforcement through integrated coursework and clinical placement (Gassas, 2021).

Another strong point of the given study is that theoretical knowledge and practical skill were both measured objectively, which makes the findings reliable to a higher extent. A similar approach could be seen in the work by De and Fink (2022), who also established a correlation between pathophysiology and the diagnostic accuracy. In their research, however, they just used students who were senior-level, whereas in this research there were students of various semesters. This wider coverage enables a more nuanced picture of the development of knowledge and skill during the overall academic journey, to which Jeffries et al. (2020), among others, have appealed through curriculum scaffolding and a proficiency-based progression of assessment (Li et al., 2024).

This strong positive association in the study also lends credence to the argument on why early and continued exposure to applied pathophysiology in clinical courses should take place. According to Mabaso and Mokoena (2022), repeated exposure to clinical cases relating to the disease mechanisms resulted in better-skilled students to make decisions patient-centered. These findings can be supplemented with this study, which shows that the relationship can be traced not only at the high levels of training but also seen at the lower levels among the students despite being in earlier semesters, though when the instructional methodology enhances clinical integration, it can also be seen (Alsunni & Rafique, 2021).

The present paper makes an addition to the existing literature and thus supports the idea that theory learning and application in nursing education need to be in proportion to each other. The results confirm that pathophysiology knowledge cannot be regarded as academic in nature but is most important in creating effective determinants of good assessors and decision-makers in the medical field (Fernandez Ros et al., 2021). Although it is not that different than global education research when it comes to the outcome, the fact that it comprises students of a resource-desperate universe such as Swat offers the context to the larger dialogue. This evidence indicates that it is possible to make significant steps toward assessment accuracy even under such conditions with educational strategies of focusing on using foundational science functionally (Srinivasan, et al., 2024).

Conclusion

This study established a strong and statistically significant relationship between pathophysiology knowledge and patient assessment accuracy among undergraduate nursing students. The findings demonstrated that students with a higher understanding of pathophysiological principles were more accurate in identifying and interpreting clinical scenarios, highlighting the importance of theoretical competence in guiding safe and effective nursing practice. Despite over half of the participants achieving satisfactory scores, a significant portion still showed gaps in knowledge and clinical application. This underscores the ongoing need for curriculum models that promote the integration of biomedical sciences with real-world patient care. The results affirm that improving students' foundational understanding of disease mechanisms directly supports the development of clinical reasoning and assessment skills essential for nursing practice.

Recommendations

1. **Integrate Pathophysiology Across Clinical Courses**

Nursing education programs should embed pathophysiological concepts throughout clinical modules rather than teaching them in isolation, allowing students to continuously apply theoretical knowledge in practical settings.

2. **Enhance Simulation-Based Learning**

Institutions should invest in high-fidelity simulations and case-based learning that mimic real-life patient presentations to strengthen students' assessment and diagnostic reasoning skills.

3. **Reinforce Competency Assessments**

Regular formative assessments that evaluate both knowledge and clinical skills should be implemented across semesters to track student progress and identify gaps early.

4. **Faculty Development and Training**

Educators should be trained in integrated teaching strategies that connect theory to clinical practice,

including the use of reflective questioning, clinical debriefing, and interdisciplinary instruction.

5. **Encourage Continuous Review and Peer Learning**

Students should be encouraged to participate in group discussions, case presentations, and peer-led review sessions that focus on linking pathophysiology to patient outcomes.

6. **Conduct Further Research**

Future studies should explore the long-term retention of pathophysiological knowledge and its impact on clinical performance during internships and early nursing practice, including diverse geographical and institutional settings.

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