Knowledge Regarding Vital Signs Among B.Sc. Nursing Students Of Chittagong Nursing College, Chattogram

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Abstract
Background: *Vital signs are objective measurements of the essential physiological functions of a living organism. They are called vital signs because assessing them is a critical first step in any clinical evaluation. This descriptive cross-sectional study was conducted to assess the level of knowledge regarding vital signs among B.Sc. in Nursing students at Chittagong Nursing College, Chattogram.*
Materials and Methods: *A descriptive cross-sectional study was conducted among 183 B.Sc. Nursing students. Data were collected based on age, sex, year of study, clinical and laboratory practice duration, workshop attendance, prior work experience, primary learning sources, self-reported confidence in vital signs assessment and knowledge levels regarding five vital signs: Pulse Rate, Blood Pressure, Respiratory Rate, Body Temperature and Oxygen Saturation (SpO$_2$).*
Results: *The majority (89.1%) of participants were female and aged 22–23 years (58.5%). Students were evenly distributed across academic years. More than half (53.6%) had more than 30 days of clinical practice, whereas 47.0% had less than 5 days of laboratory practice. Only 28.4% had attended relevant workshops. Classroom lectures (73.2%) and clinical practice (60.7%) were the primary learning sources, while skill lab use was limited (14.2%). Most students (79.2%) reported high to very high confidence in assessing and interpreting vital signs. Regarding knowledge, 60.1% demonstrated Very Good and 26.2% Excellent overall competency. Pulse Rate (69.9% Excellent) and Blood Pressure (84.2% Excellent) showed the strongest knowledge levels. Respiratory Rate (46.4% Excellent) and Oxygen Saturation (25.7% Excellent) also reflected strong understanding. However, knowledge of Body Temperature was moderate, with only 18.6% scoring Excellent and 33.9% classified as Good Knowledge.*
Conclusion: *B.Sc. Nursing students showed strong theoretical knowledge and confidence in vital signs assessment and interpreting, especially in Pulse Rate and Blood Pressure. However, gaps in laboratory exposure and low workshop participation indicate a need to strengthen hands-on training and extracurricular opportunities, particularly to improve competency in assessing Oxygen Saturation (SpO$_2$) and Body Temperature.*
Recommendation: *The study recommends curriculum enrichment through simulation-based training, standardized teaching materials, regular formative assessments and case-based discussions. Future extensive research should expand to other institutions using mixed-method and interventional designs to better understand and enhance clinical competency in nursing education.*
Keywords: *B. Sc. Nursing students, Knowledge of Vital signs assessment, Chittagong Nursing College*

I. Introduction

Vital signs are objective measurements of essential physiological functions and serve as fundamental indicators of a person's health status [1]. They are often the first considerations assessed during clinical evaluation, particularly in emergency or acute care settings where triage decisions profoundly depend on deviations from baseline values [2]. These measurements include pulse rate (PR), blood pressure (BP), respiratory rate (RR), body temperature and oxygen saturation (SpO$_2$), all of which reveal critical changes in a patient's physiological state [3-4].

Among healthcare professionals, nurses play a vigorous role in the regular monitoring of vital signs. Their ability to accurately assess and interpret these signs is central to detecting early signs of patient deterioration and initiating timely interventions [5]. Nursing students, as future frontline caregivers, are repeatedly assigned the task of monitoring vital signs during their clinical rotations, making their knowledge and capabilities in this area critical to patient safety [6].

Each vital sign offers specific insights into patient health. Pulse rate reflects cardiovascular function and varies based on physiological and emotional factors [7-8]. Blood pressure serves as an indicator for cardiovascular functionality, with deviations posing risks for conditions such as heart disease and stroke [1]. Respiratory rate is a profound yet often ignored indicator of pulmonary and metabolic function, providing early warning signs of respiratory distress [9-10]. Body temperature acts as an indicator of systemic regulation and homeostasis, reflecting infection, inflammation or metabolic dysfunction [11-12]. Lastly, oxygen saturation, typically measured through pulse oximetry, indicates the oxygenation status of the blood and is vital in assessing respiratory and circulatory efficiency [13-14].

Notwithstanding the importance of these parameters, several studies have revealed knowledge deficiencies among nursing students and practicing nurses alike. A study conducted in Saudi Arabia [6] found inadequate knowledge and poor attitudes toward vital sign monitoring, especially in relation to technological devices. Similarly, a study conducted in Pakistan [15] highlighted the need for enhanced training and practical exposure to bridge theoretical and clinical gaps. While international data suggest a growing concern about the effectiveness of current nursing education regarding vital signs, there is a significant lack of such research in the Bangladeshi context, particularly in institutions like Chittagong Nursing College.

Given the fundamental role of vital signs in nursing practice, it is imperative to assess the current knowledge levels among nursing students in Bangladesh. The ability to effectively evaluate vital signs not only facilitates early identification of clinical deterioration but also enhances clinical decision-making, supports patient safety and lays the groundwork for the development of advanced nursing competencies. This study, therefore, aims to assess the level of knowledge regarding vital signs among B.Sc. Nursing students of Chittagong Nursing College. The findings will serve as baseline data to guide educational reforms, improve clinical practical training and ensure that nursing graduates are both competent and confident in delivering high-quality, evidence-based care.

II.   Material And Methods
This quantitative descriptive study was carried out in the B. Sc. Nursing students at Chittagong Nursing College in the Chattogram district of Bangladesh from February 2025 to June 2025. A total of 183 subjects (male and female) were selected purposively from 4 Years based on equal cluster aged from 20 to 24 years for this study.

Study Design: This study was a descriptive cross-sectional in nature.

Study Location: This was public nursing college of Chattogram district of Bangladesh.

Study Duration: This study was carried out from February 2025 to June 2025.

Sample size: 183 B.Sc. in Nursing Students.

Sample size calculation: The required sample size for estimating a population proportion was calculated using Cochran's formula. We assumed a 95% confidence level, a (±5%) margin of error and a conservative estimated proportion of 50%. As our total population was relatively small (348 individuals), we applied finite population correction (FPC) formula, after application of the formula the final required sample size was 183 participants, reflecting both statistical rigor and practical feasibility within our defined population.

Subjects and selection method: This descriptive cross-sectional study applied a non-probability quota sampling technique among B.Sc. Nursing students at Chittagong Nursing College. A total of 183 students were selected proportionally across academic years: 45 each from the 1st, 2nd, and 3rd years, and 48 from the 4th year. Within each year, participants were chosen conveniently until the quotas were met. Researchers approached available students, explained the study's purpose, obtained consent, and administered a semi-structured questionnaire separately.

Inclusion criteria:
- The study was included B.Sc. in nursing students who willing to participate in the study.
- Students who was present in college during data collection.
- The students who were physically and mentally sound.

Exclusion criteria:
- The students who were found physically sick and mentally disturbed.
- Unwilling to participate in the study.

Validity and Reliability: A pilot study was conducted on 10% of the intended sample, involving 20 student nurses from other nursing college, to assess the practicality, relevance, validity and reliability of the data collection tools. This preliminary phase aimed to evaluate the possibility of the instruments and control whether any modifications or additions were needed. Based on the pilot findings and feedback from experts, necessary modifications were made to enhance the clarity and effectiveness of the tools.

Ethical consideration: Preceding to data collection, informed written consent was obtained from the principal of the college after clearly explaining the purpose of the study and the significance of their involvement. Participants were assured that their responses would remain confidential and be used fully for research purposes. The investigator ensured that all information collected was held with strict confidentiality.

Data collection techniques: After written informed consent was obtained from the principal of the college, a well-designed questionnaire was used to collect the data of the recruited students. The questionnaire included socio-demographic characteristics such as age, sex, year of study, clinical practice duration, laboratory practice duration, attendance in any workshop or seminar, previous work experience prior to admission to nursing, primary source of learning and confidence level of measuring and interpreting vital signs.

Statistical analysis: Descriptive statistics were employed to analyze the data, including frequency, percentage, mean, median, mode and standard deviation to summarize students' sociodemographic characteristics and knowledge levels across various vital signs. Tables and figures were used to present the distribution of responses, allowing for clear identification of trends and gaps. Mean scores provided an average understanding level, while standard deviation indicated variability in performance. The classification of knowledge into categories (poor to excellent) allowed for qualitative assessment.

III.   Results

Socio-demographic Characteristics (n=183)

Understanding the socio-demographic characteristics of the study population is essential for interpreting the context and relevance of research findings. These characteristics provide insight into the background, academic exposure and practical experiences of nursing students, which may influence their knowledge and confidence related to vital signs assessment. The following section outlines the distribution of participants based on variables such as age, sex, year of study, clinical and laboratory practice duration, workshop attendance, prior work experience, primary learning sources and self-reported confidence.

Distribution based on age: The majority (58.5%) of students were 22–23 years old, followed by 20–21 years (30.6%) and only 10.9% were aged 24 or older. The mean, Median, Mode and (±SD) of age was 22.11, 22, 22 and (±1.13) respectively. Age distribution indicated a narrow age range (20–24 years) and a homogeneous group in terms of age.

Distribution based on sex: The sample was predominantly female (89.1%), with only (10.9%) male, reflecting typical gender patterns seen in the nursing profession all over the world.

Distribution based on Year of Study: The sample was uniformly distributed across the first, second, and third years (24.6% each), while 26.2% were in their fourth year. This shows good representation from all academic years.

Distribution based on Clinical Practice Duration (Last 6 Months): Over half (53.6%) of the students had more than 30 days of clinical experience and another 36.1% had 21–30 days, suggesting strong clinical exposure overall. The mean clinical practice was 29 days, with a median and mode of 35 days and a (±SD) of (±8), indicating most students had substantial clinical practice experience.

Distribution based on Laboratory Practice Duration (Last 6 Months): Nearly half (47.0%) had less than 5 days of lab practice and only 21.3% had more than 20 days. The mean lab practice was 10 days, but the median (7.5) and mode (2.5) suggest a skew toward lower practice exposure. The (±SD) of (±9) indicates greater variation in lab practice experiences.

Distribution based on Attendance in Workshops or Seminars on Vital Signs: Only 28.4% of students attended such training, while 71.6% did not, highlighting a significant gap in extracurricular clinical education.

Distribution based on Work Experience Prior to Nursing Admission: A vast majority (89.1%) had no prior work experience, indicating that most students entered nursing education directly after required general education.

Distribution based on Primary Sources of Learning (Multiple Responses Allowed): The top learning source was classroom lectures (73.2%), followed by clinical practice (60.7%), and textbooks (50.8%). Only 14.2% mentioned skill labs as a learning source, suggesting a need to strengthen practical training facilities and usage.

Confidence in Measuring and Interpreting Vital Signs: A majority (67.2%) reported high confidence, and 12.0% reported very high confidence. More than 16% had moderate confidence, while 4.4% had low confidence. This indicates that nearly 80% of students are confident in their skills, though some lack assurance, which may relate to limited practical exposure (e.g., lab sessions or workshops).

Table no. 1

Socio-demographic Characteristics	no (n=183)	%
Age: (Years)		
20-21	56	30.6
22-23	107	58.5
≥24	20	10.9
Mean, Median, Mode, ±SD and Range	22.11, 22, 22, 1.13, and 20-24	
Gender:		
Male	20	10.9
Female	163	89.1
Year of Study:		
1st Year	45	24.6
2nd Year	45	24.6
3rd Year	45	24.6
4th Year	48	26.2
Duration of Clinical Practice: (Days)		
<10	9	4.9
10-20	10	5.5
21-30	66	36.1
>30	98	53.6
Mean, Median, Mode and (±SD)	29, 35, 35, and (±8)	
Duration of Lab. Practice: (Days)		
<5	86	47.0
5-10	39	21.3
11-20	19	10.4
>20	39	21.3
Mean, Median, Mode and (±SD)	10, 7.5, 2.5 and (±9)	
Attendance in any Workshop or Seminar:		
Yes	52	28.4
No	131	71.6
Work Experience Prior Nursing Admission		
Yes	20	10.9
No	163	89.1
Primary Sources of Learning (Multiple Response):		
From Classroom Lectures	134	73.2
Skill Lab	26	14.2
Clinical Practice	111	60.7
Text Books	93	50.8
Confidence of Measuring & Interpreting Vital Signs:		
Very High Confidence	22	12.0
High Confidence	123	67.2
Moderate Confidence	30	16.4
Low Confidence	8	4.4

Knowledge Regarding Individual Vital Signs (n = 183)

This table presents the levels of knowledge (from Poor to Excellent) of B.Sc. in Nursing students regarding five vital signs: Pulse Rate, Blood Pressure, Respiratory Rate, Body Temperature, and Oxygen Saturation (SpO₂) along with descriptive statistics.

Table no. 2

Knowledge regarding Individual Vital Signs	Poor n(%)	Average n(%)	Good n(%)	Very Good n(%)	Excellent n(%)	Total n(%)
Knowledge of Pulse Rate (PR)	0(0.0)	2(1.0)	18(9.8)	35(19.1)	128(69.9)	183(100)
Mean, Median, Mode and (±SD)	20.26, 21.0, 21.0 and ±3.6					
Knowledge of Blood Pressure (BP)	4(2.2)	5(2.7)	4(2.2)	16(8.7)	154(84.2)	183(100)

Mean, Median, Mode and (±SD)	21.78, 21.0, 25.0 and ±4.45				
Knowledge of Respiratory Rate (RR)	9(4.9)	8(4.4)	29(15.8)	52(28.4)	85(46.4)	183(100)
Mean, Median, Mode and (±SD)	17.87, 17.0, 21.0 and ±5.13				
Knowledge of Body Temperature	9(4.9)	35(19.1)	62(33.9)	43(23.5)	34(18.6)	183(100)
Mean, Median, Mode and (±SD)	14.35, 13.0, 13.0 and ±4.68				
Oxygen Saturation Rate (SpO$_2$)	3(1.6)	9(4.9)	53(29.0)	71(38.8)	47(25.7)	183(100)
Mean, Median, Mode and (±SD)	16.39, 17.0, 17.0 and ±3.90				

Knowledge of Pulse Rate (PR): An overwhelming majority (69.9%) of students scored Excellent and 19.1% scored Very Good. Only 2 students (1%) had Average Knowledge; no one found category of Poor Knowledge. Mean, Median, Mode and (±SD) was 20.26, 21.0, 21.0 and (±3.86) respectively.

Knowledge of Blood Pressure (BP): A most of the students (84.2%) Excellent Knowledge and 8.7% Very Good Knowledge category. Only a few students (total 13 or 7.1%) fell into the Poor to Good Knowledge categories. Mean, Median, Mode and (±SD) was 21.78, 21.0, 25.0 and (±4.45) respectively.

Knowledge of Respiratory Rate (RR): Nearly half of the students (46.4%) showed Excellent Knowledge and 28.4% had Very Good Knowledge. However, 15.8% had Good and 9.3% had Average to Poor Knowledge. Mean, Median, Mode and (±SD) was 17.87, 17.0, 21.0 and (±5.13) respectively. Findings suggests reasonably strong knowledge but with greater variability and a few students needing improvement.
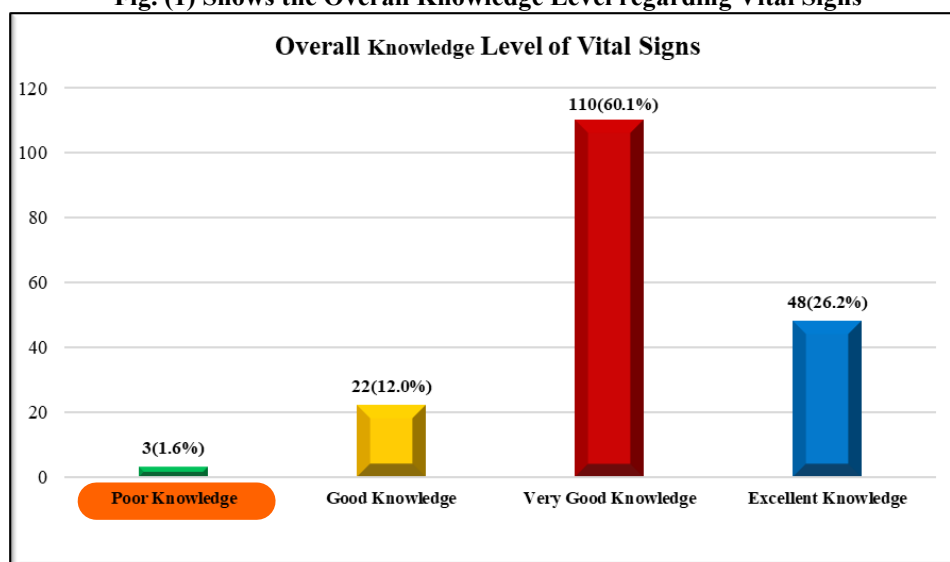
Knowledge of Body Temperature: Only 18.6% of students scored Excellent Knowledge and 23.5% scored Very Good Knowledge. A significant 33.9% had Good Knowledge, while 19.1% were Average and 4.9% scored Poor Knowledge. The Mean, Median, Mode and (±SD) was 14.35, 13.0, 13.0 and (±4.68) respectively. Findings indicated a moderate level of knowledge, with many students showing only average to good understanding and room for improvement.

Knowledge of Oxygen Saturation (SpO$_2$): About 64.5% had Very Good to Excellent Knowledge, while 29% were in the Good Knowledge category. Few students scored Average (4.9%) or Poor (1.6%). Mean, Median, Mode and (±SD) was 16.39, 17.0, 17.0, (±3.90) respectively. Findings show a generally strong understanding, though the statistical inconsistency should be corrected for clarity.

Overall, Knowledge Level of Vital Signs (n = 183)

Fig. (1) shows the analysis of the overall knowledge level regarding vital signs among B.Sc. Nursing students. Study revealed that the majority demonstrated a high level of competency. Specifically, 60.1% of the respondents exhibited Very Good Knowledge, while 26.2% were categorized as having Excellent Knowledge. A smaller proportion, 12.0%, showed Good Knowledge and only least 1.6% fell into the Average Knowledge category. There was found no category of Poor Knowledge. Overall, these findings suggest that the theoretical understanding of vital signs among the students is strong, though there remains a small segment of the population that could benefit from further academic or clinical reinforcement.

Fig. (1) Shows the Overall Knowledge Level regarding Vital Signs

IV. Discussion

This study aimed to assess the knowledge of B.Sc. nursing students regarding vital signs across five key domains: Pulse Rate (PR), Blood Pressure (BP), Respiratory Rate (RR), Body Temperature and Oxygen Saturation (SpO$_2$). The results reveal that the majority of participants demonstrated a high level of theoretical knowledge in all domains, with notable variation in performance across individual components. These findings align with and extend existing research, providing insight into both the strengths and limitations of current nursing education approaches.

Knowledge regarding Pulse Rate (PR)

A significant proportion (69.9%) of students had Excellent Knowledge in pulse rate, with nearly 90% categorized as Very Good or higher. This suggests that the curriculum places strong emphasis on PR assessment, fostering robust conceptual understanding. These results correspond with the research conducted by Dal & Sarpkaya [16], who observed substantial theoretical gains in cardiopulmonary knowledge among nursing students following training. However, both studies emphasize the importance of reinforcement to maintain these gains over time. Compared to a study conducted by Hanif et al. [15], where only 58.6% of Pakistani nursing students could associate vital signs with clinical pathophysiology, the current results demonstrate a stronger knowledge base, likely influenced by structured theoretical emphasis and recent pedagogical improvements.

Knowledge regarding Blood Pressure (BP)

BP assessment revealed the highest knowledge performance among students, with 84.2% rated as Excellent. The mean score of 21.78 (±4.45) indicates a narrow distribution toward high performance. These findings are consistent with [17], who found high theoretical understanding among nursing students regarding BP concepts but also identified procedural skill gaps. The current study further aligns with [18], who noted poor BP measurement knowledge among in-service nurses in Karachi. This contrast underscores the effectiveness of recent theoretical education for students, while reinforcing the necessity of ongoing, hands-on training to maintain competency in clinical settings.

Knowledge regarding Respiratory Rate (RR)

Knowledge regarding RR was also commendable, with 46.4% of students scoring at the excellent level and an overall mean of 17.87 (±5.13). Despite being commonly neglected in clinical practice revealed from the study conducted by Elliott [10], RR received significant attention in this study's cohort. The results are higher than those reported by research conducted by Hanif et al. [15], where students demonstrated difficulty interpreting RR changes. As suggested by findings of a study conducted by Mohammed [19], poor RR assessment is often attributed to insufficient training and undervaluation in practice. Our findings suggest that the curriculum has addressed these challenges, although the integration of clinical simulation and supervision remains essential to translate theoretical understanding into consistent clinical performance.

Knowledge regarding Body Temperature

Knowledge of body temperature measurement demonstrated relatively moderate outcomes compared to other domains. Only 18.6% of students achieved excellent scores, with a notable 19.1% rated as average and 4.9% poor. The mean score of 14.35 (±4.68) indicates considerable variance in understanding, particularly in technical aspects such as accurate measurement sites and documentation. These findings echo those of the findings of the study done by Evans & Kenkre [20], who reported similar knowledge deficiencies among UK nurses. Additionally, study conducted by Akyuz & Kaya [21] highlighted the role of insufficient practical instruction and confusion over standard procedures as significant barriers to competence. A study conducted by Honaker et al. [22] further confirmed that even after training, knowledge gaps persist, emphasizing the importance of early, ongoing clinical education to address persistent misconceptions.

Knowledge regarding Oxygen Saturation (SpO$_2$)

The majority of students (93.5%) in this study demonstrated good to excellent knowledge in SpO$_2$ monitoring, with a mean score of 16.39 (±3.90). This reflects strong theoretical foundations, likely due to improved curricular coverage. However, practical decision-making gaps were evident, only 21.3% could identify appropriate action in cases of poor peripheral circulation. These findings resonate with the study of Hasanien and Albusoul [23], who noted that many practicing nurses were unaware of pulse oximeter limitations. Similar deficiencies in SpO$_2$ knowledge were reported by Milutinovic et al. [24], highlighting widespread challenges in translating device knowledge into clinical action. Thus, this study supports the inclusion of scenario-based learning and hands-on application in nursing education to improve competency in real-world conditions.

Overall, Knowledge of Vital Signs

The cumulative results show that 86.3% of students demonstrated Very Good to Excellent Knowledge of vital signs, with none scoring in the Poor category. The overall mean score was 90.66 (±13.90), reflecting effective theoretical instruction and possibly the positive impact of aligned clinical experiences. These findings are consistent with the study conducted by Alshehry et al. [25], who found that higher knowledge and competence correlated with improved attitudes and safer practices among Saudi nursing students. Similarly, study conducted by Mohammed [17] emphasized the necessity of combining theoretical instruction with skill-based learning to ensure effective vital signs monitoring.

Despite high theoretical achievement, this study supports a growing consensus that theoretical knowledge alone is insufficient. Gaps in practical application, especially in technical or less emphasized areas like temperature documentation and SpO_2 troubleshooting, suggest the need for curriculum enhancement. Incorporating regular simulation exercises, skill stations, competency checklists and supervised bedside practice may significantly improve clinical translation.

Limitations of the Study: Notwithstanding providing valuable insights into the knowledge of B.Sc. Nursing Students regarding vital signs, this study has certain limitations. Firstly, the research was confined to a single public nursing college in Chattogram, which may limit the generalizability of the findings to nursing students in other regions or institutions of Bangladesh. Secondly, the use of a self-administered questionnaire may have introduced response bias, as students might have overrated or underrated their knowledge levels. Thirdly, the study concentrated entirely on theoretical knowledge and did not assess students' actual clinical performance or practical skills in vital sign monitoring, which are equally vital in evaluating capability. Moreover, the cross-sectional nature of the study does not allow for causal inferences or tracking changes in knowledge over time.

Future studies should consider including multiple institutions, adopt mixed-method approaches and incorporate practical assessments or observational checklists to provide a more comprehensive evaluation of student competence in vital sign assessment.

Implications and Recommendations: The findings highlight that nursing curricula should continue to focus on foundational knowledge while increasingly integrating practical, simulation-based learning environments. Curriculum designers should ensure that vital signs assessment is not only taught theoretically but also reinforced through repeated practice. In-service training models could also benefit from similar strategies, especially considering the performance gap noted between students and practicing nurses.

V.   Conclusion

According to this study, B.Sc. Nursing Students have a concrete theoretical foundation in Vital Signs assessment, particularly when it comes to Blood Pressure and Pulse Rate monitoring. The usefulness of current curricular approaches in stimulating key clinical knowledge is revealed by the large percentage of students who attained Very Good to Excellent scores across the five domains: Pulse Rate, Blood Pressure, Respiratory Rate, Body Temperature and Oxygen Saturation.

The results, however, also highlight enduring insufficiencies in the application of information, especially in more complex or technical areas like accurate temperature charting and oxygen saturation troubleshooting, despite the overall excellent performance. These failings are indicative of a larger issue that has been identified in both domestic and foreign literature: theoretical knowledge does not always associate to clinical proficiency.

Nursing education needs to change beyond improving instruction in order to close this gap. To strengthen knowledge and improve skill retention, simulation-based learning, organized clinical supervision and regular practical experience must be combined. The development of critical thinking and decision-making abilities in actual clinical situations can also be aided by scenario-based training and regular competency tests.

Although a strong theoretical foundation for vital sign monitoring has been successfully built by the existing curriculum, more focus on developing practical skills is required. Nursing students will be more prepared to provide competent and confident patient care if the connection between knowledge and practice is strengthened through realistic learning. This will eventually improve clinical outcomes and healthcare safety.

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