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Skill Training Programme on Knowledge and Skills Regarding Uses of Instruments and Devices in Intensive Care Unit: Nursing Students in Tertiary Care Hospital, Vadodara

Surbhi Damar[1*], Heena Baria[2]

[1*]Post Graduate Student, Department of Medical-Surgical Nursing, Parul Institute of Nursing, Parul University, Vadodara, Gujarat.
[2]Assistant Professor, Department of Medical-Surgical Nursing, Parul Institute of Nursing, Parul University, Vadodara, Gujarat.

Corresponding Email: [1*]surbhidamar@gmail.com

Abstract: Background: ICUs are highly specialized hospital areas equipped with critical care tools like motorized beds, monitors, ventilators, pumps, defibrillators, and trolleys. Nursing schools aim to train novice nurses effectively to meet rising healthcare demands. Skill training programs help students adapt to modern healthcare's technical challenges, ensuring they acquire practical skills for safe and efficient patient care.
Objectives: The objectives of the study were to assess the knowledge and skills of nursing students regarding uses of instruments and devices in intensive care unit. Determine the effectiveness of skill training programme on knowledge and skills of nursing students regarding uses of instruments and devices in intensive care unit. Determine association between demographic variables and pre-test knowledge and skill score.
Materials and Methods: This study utilized a quantitative research approach with a one-group pre-test post-test design to evaluate the effectiveness of skill training program on nursing students' knowledge and skills related to ICU instruments and devices usage. Non-probability convenience sampling was employed to select 100 nursing students from Parul Institute of Nursing, Vadodara. Sociodemographic data and ICU instruments and devices usage knowledge were assessed using a self-structured questionnaire. Skills were evaluated using a modified checklist covering ventilator operation, syringe infusion pump operation, basic airway device handling, instruments of intubation trolley management, and defibrillator operation.
Results: Pre-test knowledge mean score was 10.32, increasing significantly to 13.81 in the post-test ($t=6.992$, $p=0.0001$), indicating program effectiveness. Skill scores also significantly improved: for ventilator operation, mean pre-test score was 3.11, increasing to 8.13 ($t=21.738$, $p=0.0001$); for syringe infusion pump, pre-test mean score was 2.87, increasing to 9.57 ($t=29.206$, $p=0.0001$); for basic airway devices, pre-test mean score was 7.88, increasing to 16.75 ($t=20.187$, $p=0.0001$); for instruments of Intubation Trolley, pre-test mean score was 7.64, increasing to 21.43 ($t=32.069$, $p=0.0001$); and for defibrillator operation, pre-test mean score was 2.12, increasing to 7.80 ($t=43.896$, $p=0.0001$). These findings suggest significant improvement in students' skills across all areas following the skill training program, with no significant association found between pre-test scores and demographic variables. Overall, the program effectively enhanced students' competence and confidence in handling ICU tasks.
Conclusion: Throughout the training, nursing students gained competence and confidence, preparing them for their clinical internships and enabling them to provide higher quality care to patients. Overall, nursing students notably improved their skills and are now more assured in their ability to handle intensive care assignments. The skill training program was deemed effective in this study.

Keywords: Skill Training Program (STP), ICU Instruments and Devices, Nursing Students, Knowledge, Skills, Tertiary Care Hospital.

1. Introduction

The expertise, equipment, and care standards for critically ill patients have significantly advanced in recent decades, leading to the establishment of intensive care units (ICUs). These units are specialized areas within hospitals dedicated to providing comprehensive treatment for severely ill patients. Staffed with highly trained

medical and nursing professionals, ICUs adhere to strict protocols and procedures while conducting research and quality assurance programs to ensure optimal patient care.[1]

According to a survey of 23 Asian ICUs, there are 3.6 ICU beds per 100,000 people in Asia, which is significantly lower than in Western countries. Estimates suggest that India has 2.3 ICU beds per 100,000 people, although this figure may be underestimated. Notably, urban areas have a higher concentration of ICU beds and intensivists compared to semi-urban and rural areas.[2]

The ICU equipment market has expanded due to the rise in chronic illnesses such as respiratory conditions (e.g., asthma, COPD), renal disease, heart attacks, and cancer. Heart disease, causing around 647,000 deaths annually in the US, remains a leading cause of fatalities. Globally, the increasing prevalence of illnesses, particularly among the aging population, has driven the demand for ICU equipment. Technological advancements have improved ICU equipment design, boosting patient preference and market growth. Additionally, the Asia-Pacific region is expected to see a significant increase in the elderly population, further driving the need for critical care resources.[3]

Prime Minister Shri Narendra Modi launched the Pradhan Mantri Ayushman Bharat Health Infrastructure Mission, which aims to establish Critical Care Hospital Blocks in districts with over 500,000 residents, state government medical colleges/district hospitals, and 12 Central Institutions. Each block will have 100 beds, including 20 ICU beds equipped with essential critical care equipment such as motorized ICU beds, multipara monitors, ICU ventilators, syringe pumps, biphasic defibrillators, instrument trolleys, ECG machine trolleys, and a crash cart.[4]

Nursing institutions are facing the challenge of training novice nurses to be clinically competent to meet the rising healthcare demands driven by an aging population and an expected shortage of nursing professionals. The significant increase in life expectancy since 1990 has led to a surge in non-communicable diseases, creating a demand for more healthcare beds and nursing staff.[5]

The World Health Organization projects a global need for 9 million additional nurses and midwives by 2030,[6] while the American Association of Nurses anticipates a need for 1.1 million new nurses by 2022 to replace retiring ones.[7] India, a major source of nurses for Gulf and OECD countries, is experiencing a shortage of over 2 million nurses.[8]

While there's been a rise in the number of nurses being trained, maintaining quality amidst quantity remains a challenge. It's crucial to ensure that newly trained nurses are promptly equipped to handle their responsibilities, ensuring patient safety and maintaining care quality. Practical skills development through clinical education is essential in preparing students for employment in real clinical settings, especially in intensive care units (ICUs). Skill training programs focusing on ICU equipment are vital in shaping nursing students' proficiency in delivering safe and effective care to critically ill patients. The investment in their education not only benefits individual students but also improves patient outcomes in critical care environments.

2. Materials and Methods

The study employed a quantitative approach and utilized a one-group pre-test and post-test research design. A total of 100 fourth-year B.Sc. nursing students from Parul Institute of Nursing, Vadodara, Gujarat, India, were selected using a non-probability convenience sampling technique. The study was based on Bertanlanffy's General System Theory and implemented a conceptual framework model. The knowledge and skills of the fourth-year B.Sc. nursing students were assessed using a self-structured knowledge questionnaire consisting of 30 items and a self-structured skill checklist for assessing proficiency in using ICU instruments and devices. The skill training program included theoretical sessions and practical demonstrations covering various intensive care equipment and devices. The theoretical session lasted 60 minutes and provided comprehensive knowledge on various ICU instruments and devices, followed by practical demonstrations at five skill stations covering ventilator, syringe infusion pump, basic airway devices, intubation trolley, and defibrillator, with step-by-step instructions on their operation.

Inclusion Criteria

All fourth-year B.Sc. nursing students enrolled at Parul Institute of Nursing, within Parul University, Vadodara, are eligible to participate in the study. Participants should not have prior familiarity with the usage of ICU instruments and devices. This includes students who have not undergone clinical postings in various ICUs. Participation is voluntary, and students who express willingness to take part are encouraged to join the study.

Data Collection

The research tool comprised three distinct sections: socio-demographic data, a self-structured knowledge questionnaire, and a self-structured skill checklist for assessing proficiency in utilizing ICU instruments and devices across five stations: Ventilator, Syringe Infusion Pump, Defibrillator, Basic Airway Devices, and Intubation Trolley. The researcher elucidated the study's objectives and significance to participants before seeking their cooperation. The questionnaire encompassed inquiries regarding each of the aforementioned skill areas. Additionally, a self-structured skill checklist was employed for evaluating proficiency in these five domains. To ensure content validity, the self-structured questionnaire and skill checklist, along with demographic data, were submitted to 15 experts chosen for their clinical expertise, experience, and relevance to the study's focus. Feedback was obtained from 12 nursing and medical professionals, leading to refinement and reorganization of the items for improved clarity and coherence.

Data Analysis

Data analysis was conducted utilizing SPSS Version 25.0 (Statistical Package for the Social Sciences), employing both descriptive and inferential statistical methods. Descriptive statistics were utilized to present demographic characteristics, employing measures such as frequency, percentage, mean, and standard deviation to gauge the level of knowledge and skills. Inferential statistics, specifically paired 't'-tests, were employed to evaluate the efficacy of the skill training program, while chi-square tests were utilized to explore associations between pre-test levels of knowledge and skills regarding instrument and device utilization and participants' socio-demographic variables.

3. Results

Section 1: Findings related to demographic data of participants.

Table 1: shows numerous crucial insights into the participants' demographic features. In terms of age distribution, the majority (72%) is between 20 and 21 years old, with 23% between 22 and 23 years old. Participants aged 18-19 years make up a lower fraction (4%), while those aged 24 and higher account for only 1% of the total. Gender distribution reveals that the majority of participants are female (81%), with males accounting for the remaining 19%. In terms of clinical practice hours, the data shows a skewed distribution. Notably, 55% of participants devote 24 hours or more to clinical practice every week. In terms of exposure to various intensive care units, the general ICU has the largest rate (43%) followed by the emergency ICU (38%). Participants with Neonatal ICU (NICU) exposure account for 11%, with Intensive Coronary Care Unit (ICCU) exposure accounting for 8%.

Frequency Distribution of participants as per Demographic Variables. n=100			
Sr. No.	Demographic Variable	Frequency	Percentage (%)
1	Age		
	18 – 19 Years	4	4%
	20 – 21 Years	72	72%
	22 – 23 Years	23	23%
	24 & Above	1	1%
2	Gender		
	Male	19	19%
	Female	81	81%
3	Hours spent in clinical practice		
	Less than 8 hours/ week	10	10%

	8-12 hours / week	17	17%
	16-20 hours / week	18	18%
	24 hours and above / week	55	55%
4	Exposure to various Intensive care units		
	Emergency ICU	38	38%
	ICCU- Intensive Coronary Care Unit	8	8%
	ICU	43	43%
	NICU	11	11%

Section 2: Findings Related to Knowledge And Skills of Participants on Skill Training Programme Regarding Uses of Instruments And Devices in Intensive Care Unit.

Table 2: comparison of knowledge scores before and after the test among 100 participants on the uses of ICU instruments and devices reveals a positive shift in understanding. The percentage of participants with poor scores decreased significantly from 26% in the pre-test to 6% in the post-test, indicating an improvement in comprehension. The majority of participants maintained average scores in both tests (71% pre-test, 75% post-test), suggesting consistent understanding. Notably, the percentage of participants with good scores increased from 3% to 10%, reflecting substantial progress. Whereas, participants achieved an excellent score increased from 0% to 9%, indicating that the knowledge level reach the highest category for the participants. Overall, the findings suggest an overall enhancement in knowledge levels, particularly in the categories of poor, good and excellent scores.

Table 2: Comparison of Pre and Post-test Knowledge Scores of participants. n=100		
Knowledge Score	Pre-Test	Post-test
	Frequency (%)	Frequency (%)
Poor Score (≤8)	26 (26%)	6 (6%)
Average Score (9-16)	71 (71%)	75 (75%)
Good Score (17 – 24)	3 (3%)	10 (10%)
Excellent Score (25>)	0 (0%)	09 (09%)
TOTAL	100(100%)	100(100%)

Table 3: illustrates the comparison of pre and post-test skills scores of 100 participants pertaining to operate Ventilator indicates a substantial improvement. The percentage of participants with poor skills (≤3) decreased from 60% in the pre-test to 5% in the post-test, while those with good skills (>6) increased from 0% to 79%. The majority of participants shifted from average scores (4-6) in the pre-test 40% to 16% in the post-test. Overall, the findings highlight a significant enhancement in participants' ventilator-related skills following the training or educational intervention.

Table 3: Comparison of Pre and Post-test Skills Scores of participants pertaining to operate Ventilator. n=100		
Skills Score	Pre-Test	Post-test
	Frequency (%)	Frequency (%)

Poor Score (≤3)	60(60%)	5(5%)
Average Score (4-6)	40 (40%)	16 (16%)
Good Score (≥6)	0 (0%)	79 (79%)
TOTAL	100(100%)	100(100%)

Table 4: illustrates comparison of pre and post-test skills scores pertaining to operate syringe infusion pumps for 100 participants reveals a substantial improvement in proficiency. The majority shifted from poor skills 74% in the pre-test to only 2% in the post-test, while those with good skills (>9) increased from 0% to 75%. The percentage of participants with average scores (4-6) decreased from 26% to 23%. Overall, the findings highlight a significant positive impact of the training or educational intervention on participants' skills in handling syringe infusion pumps.

Table 4: Comparison of Pre and Post-test Skills Scores of participants pertaining to operate Syringe Infusion Pump. n=100		
Skills Score	Pre-Test	Post-test
	Frequency (%)	Frequency (%)
Poor Score (≤3)	74 (74%)	2 (2%)
Average Score (4-6)	26 (26 %)	23 (23%)
Good Score (≥9)	0 (0%)	75 (75%)
TOTAL	100(100%)	100(100%)

Table 5: illustrates the comparison between pre and post-test skill scores for 100 participants pertaining to operate basic airway devices reveals a significant improvement in proficiency. Poor scores decreased from 20% to 1%, while good scores increased from 0% to 74%. The majority with average scores decreased from 80% to 25%. Overall, the findings highlight a substantial positive impact of the training or educational intervention on participants' skills in managing basic airway devices.

Table 5: Comparison of Pre and Post-test Skills Scores of participants pertaining to operate Basic airway devices. n=100		
Skills Score	Pre-Test	Post-test
	Frequency (%)	Frequency (%)
Poor Score (≤5)	20(20%)	1 (1%)
Average Score (6-15)	80 (80 %)	25 (25%)
Good Score (≥16)	0 (0%)	74 (74%)
TOTAL	100(100%)	100(100%)

Table 6 demonstrates the comparison of pre and post-test skills scores on intubation trolley for 100 participants indicates a significant improvement in proficiency. Poor scores decreased from 64% to 0%, average scores decreased from 33% to 5%, and good scores increased from 3% to 84%. While no participants achieved an excellent score in the pre-test, 11% reached this level in the post-test. Overall, the results highlight a substantial positive impact of the training or educational intervention on participants' skills in managing intubation trolleys.

Table 6: Comparison of Pre and Post-test Skills Scores of participants pertaining to operate Intubation Trolley. n=100		
Skills Score	Pre-Test	Post-test
	Frequency (%)	Frequency (%)
Poor Score (≤8)	64 (64%)	0 (0%)
Average Score (9-16)	33 (33%)	5 (5%)
Good Score (17-24)	3(3%)	84 (84%)
Excellent Score (25>)	0 (0%)	11 (11%)
TOTAL	100(100%)	100(100%)

Table 7 demonstrates the comparison of pre and post-test skills scores on defibrillators for 100 participants reveals a remarkable improvement in proficiency. Poor scores decreased from 94% to 0%, while average scores increased from 6% to 79%. Additionally, good scores rose from 0% to 21%. The data highlights a significant positive impact of the training or educational intervention on participants' skills in using defibrillators.

Table 7: Comparison of Pre and Post-test Skills Scores of participants pertaining to operate Defibrillator. n=100		
Skills Score	Pre-Test	Post-test
	Frequency (%)	Frequency (%)
Poor Score (≤3)	94 (94%)	0 (0%)
Average Score (4-8)	6 (6%)	79 (79%)
Good Score (9≥)	0(0%)	21 (21%)
TOTAL	100(100%)	100(100%)

Table 8 compares the knowledge scores on the uses of ICU instruments and devices for 100 participants demonstrates a significant improvement post-intervention. The mean post-test score of 13.81, accompanied by standard deviation of 3.422, is significantly higher than the pre-test mean of 10.32 with a standard deviation of 3.396. The calculated t' value of 6.922, with 99 degrees of freedom, surpasses the critical t' table value of 1.984, yielding a highly significant p-value of 0.0001. These results strongly indicate a substantial increase in participants' knowledge after the intervention, highlighting the effectiveness of the educational program.

Table 8: Comparison of overall Knowledge Scores of participants on uses of ICU instruments and devices						
Knowledge Score	Mean Score	Standard Deviation	Degree of Freedom	Calculated 't' Value	't' Table Value	p-value
Post-test	13.81	3.422	99	6.922	1.984	0.0001*
Pre-test	10.32	3.396				

Table 9 compares the of overall skills scores on ventilators for 100 participants reveals a significant improvement post-intervention. The mean post-test score of 8.13, accompanied by a standard deviation of 2.214, is notably greater than the pre-test mean of 3.11 accompanied by a standard deviation of 1.399. The calculated t' value of 21.738, surpassing the critical t' table value of 1.984 for 99 degrees of freedom, yields a

highly significant p-value of 0.0001. These results indicate a substantial and statistically significant enhancement in participants' ventilator management skills following the educational intervention.

Table 9: Comparison of overall Skills Scores of participants pertaining to operate Ventilator. n=100

Skills Score Ventilator	Mean Score	Standard Deviation	Degree Of Freedom	Calculated 't' Value	't' Table Value	p-value
Post-test	8.13	2.214	99	21.738	1.984	0.0001*
Pre-test	3.11	1.399				

Table 10 compares the of overall skills scores on syringe infusion pumps for 100 participants indicates a significant improvement post-intervention. The mean post-test score of 9.57, with a standard deviation of 2.248, is considerably higher than the pre-test mean of 2.87 with a standard deviation of 1.152. The calculated 't' value of 29.206, surpassing the critical 't' table value of 1.984 for 99 degrees of freedom, yields a highly significant p-value of 0.0001. These results affirm a substantial and statistically significant enhancement in participants' skills with syringe infusion pumps following the educational intervention.

Table 10: Comparison of overall Skills Scores of participants pertaining to operate Syringe Infusion pump. n=100

Skills Score Syringe Infusion pump	Mean Score	Standard Deviation	Degree Of Freedom	Calculated 't' Value	't' Table Value	p-value
Post-test	9.57	2.248	99	29.206	1.984	0.0001*
Pre-test	2.87	1.152				

Table 11 compares the of overall skills scores on basic airway devices for 100 participants indicates a notable enhancement post-intervention. The average post test score was 16.75, accompanied by a standard deviation of 3.245, is significantly higher than the pre-test mean of 7.88 , accompanied by a standard deviation of 2.948. The computed 't' value of 20.187 exceeds the critical 't' table value of 1.984 for 99 degrees of freedom, yielding a highly significant p-value of 0.0001. These results affirm a substantial and statistically significant enhancement in participants' skills with basic airway devices following the educational intervention.

Table 11: Comparison of overall Skills Scores of participants pertaining to operate Basic Airway Devices. n=100

Skills Score Basic Airway Devices	Mean Score	Standard Deviation	Degree Of Freedom	Calculated 't' Value	't' Table Value	p-value
Post-test	16.75	3.245	99	20.187	1.984	0.0001*
Pre-test	7.88	2.948				

Table 12 compares skills scores of 100 participants before and after Intubation Trolley training. The post-test mean score 21.43 significantly increased from the pre-test mean 7.64, with a calculated 't' value of 32.069

(exceeding the critical 't' value of 1.984) and a very low p-value of 0.0001. This indicates a statistically significant improvement in skills following the training on the Intubation Trolley.

Table 12: Comparison of overall Skills Scores of participants pertaining to operate instruments of Intubation Trolley. n=100

Skills Score Intubation Trolley	Mean Score	Standard Deviation	Degree Of Freedom	Calculated 't' Value	't' Table Value	p-value
Post-test	21.43	2.958	99	32.069	1.984	0.0001*
Pre-test	7.64	3.597				

Table 13 compares the skills scores of 100 participants before and after defibrillator training. The post-test mean score 7.80 significantly increased from the pre-test mean 2.12, with a calculated 't' value of 43.896 (greater than the critical 't' value of 1.984) and a very low p-value of 0.0001. This indicates a statistically significant improvement in defibrillator skills following the training program.

Table 13: Comparison of overall Skills Scores of participants pertaining to operate Defibrillator. n=100

Skills Score Defibrillator	Mean Score	Standard Deviation	Degree Of Freedom	Calculated 't' Value	't' Table Value	p-value
Post-test	7.80	2.958	99	43.896	1.984	0.0001*
Pre-test	2.12	3.597				

Section 2.1

Table 14 shows no statistically significant association between pre-test knowledge scores and demographic variables such as age, hours spent in clinical practice, and exposure to different intensive care units. However, there is a borderline significance with gender, suggesting a potential trend that may warrant further investigation.

Table 14: Findings related to the association of the demographic variables with pre-test knowledge score of the participants on (STP) skill training programme. n=100

Sr. No	Demographic Variable	F	Knowledge Score			X^2 Value	df	p-value
			Poor	Average	Good			
1	Age							
	18 – 19 Years	4	2	2	0	5.318	6	0.504
	20 – 21 Years	72	17	52	3			
	22 – 23 Years	23	6	17	0			
	24 & Above	1	1	0	0			
2	Gender							
	Male	19	9	10	0	5.938	2	0.051
	Female	81	17	61	3			

3	Hours spent in clinical practice							
	Less than 8 hours/ week	10	9	20	1	5.906	6	0.434
	8-12 hours / week	17	7	11	0			
	16-20 hours / week	18	5	12	0			
	24 hours and above / week	55	5	28	2			
4	Exposure to various Intensive care units							
	Emergency ICU	38	11	26	1	5.723	6	0.455
	ICCU- Intensive Coronary Care Unit	8	3	4	1			
	ICU	43	8	34	1			
	NICU	11	4	7	0			

Table 15 reveals that age, gender, and hours spent in clinical practice are not significantly associated with ventilator skill scores among 100 participants. However, there is a borderline significance with exposure to various intensive care units, indicating a potential trend that may need further investigation.

Table 16 indicates that among the demographic variables (age, gender, hours in clinical practice, and exposure to different intensive care units), none show a significant association with Skill Scores on syringe infusion pump.

Table 15: Findings related to the association of the demographic variables with pre-test skill score of ventilator. n=100

Sr. No	Demographic Variable	F	Skill Score		X^2 Value	df	p-value
			Poor	Average			
1	Age						
	18 – 19 Years	4	4	0	4.285	3	0.232
	20 – 21 Years	72	43	29			
	22 – 23 Years	23	13	10			
	24 & Above	1	0	1			
2	Gender						
	Male	19	11	8	0.043	1	0.835
	Female	81	49	32			
3	Hours spent in clinical practice						
	Less than 8 hours/ week	10	16	14	2.967	3	0.397
	8-12 hours / week	17	9	9			
	16-20 hours / week	18	14	3			
	24 hours and above / week	55	21	14			
4	Exposure to various Intensive care units						
	Emergency ICU	38	23	15	5.723	6	0.455
	ICCU- Intensive Coronary Care Unit	8	5	3			
	ICU	43	23	20			
	NICU	11	9	2			

Table 16: Findings related to the association of the demographic variables with pre-test skill score of syringe infusion pump. n=100							
Sr. No.	Demographic Variable	F	Skill Score		X^2 Value	df	p-value
			Poor	Average			
1	Age						
	18 – 19 Years	4	3	1	2.949	3	0.400
	20 – 21 Years	72	56	16			
	22 – 23 Years	23	14	9			
	24 & Above	1	1	0			
2	Gender						
	Male	19	15	4	0.298	1	0.585
	Female	81	59	22			
3	Hours spent in clinical practice						
	Less than 8 hours/ week	10	21	9	4.449	3	0.217
	8-12 hours / week	17	12	6			
	16-20 hours / week	18	16	1			
	24 hours and above / week	55	25	10			
4	Exposure to various Intensive care units						
	Emergency ICU	38	26	12	2.257	3	0.221
	ICCU- Intensive Coronary Care Unit	8	6	2			
	ICU	43	32	11			
	NICU	11	10	1			

Table 17 reveals that among the demographic variables (age, gender, hours in clinical practice, and exposure to different intensive care units), none exhibit a significant association with Skill Scores on basic airway devices for the participants in this study.

Table 17: Findings related to the association of the demographic variables with pre-test skill score of basic airway devices. n=100							
Sr. No.	Demographic Variable	F	Skill Score		X^2 Value	df	p-value
			Poor	Average			
1	Age						

	18 – 19 Years	4	0	4	2.985	3	0.394
	20 – 21 Years	72	13	59			
	22 – 23 Years	23	7	16			
	24 & Above	1	0	1			
2	Gender						
	Male	19	2	17	1.316	1	0.251
	Female	81	18	63			
3	Hours spent in clinical practice						
	Less than 8 hours/ week	10	7	23	4.822	3	0.185
	8-12 hours / week	17	2	16			
	16-20 hours / week	18	1	16			
	24 hours and above / week	55	10	25			
4	Exposure to various Intensive care units						
	Emergency ICU	38	6	32	1.998	3	0.573
	ICCU- Intensive Coronary Care Unit	8	3	5			
	ICU	43	9	34			
	NICU	11	2	9			

Table 18 indicates that among the demographic variables (age, gender, and exposure to various intensive care units), only the hours spent in clinical practice per week show a significant association with Skill Scores on operating intubation trolley instruments with age, gender, and exposure to different intensive care units do not exhibit significant associations with intubation trolley skill scores in the given sample.

Table 18: Findings related to the association of the demographic variables with pre-test skill score of intubation trolley. n=100

Sr. No.	Demographic Variable	F	Skill Score			X^2 Value	df	p-value
			Poor	Average	Good			
1	Age							
	18 – 19 Years	4	3	1	0	3.766	6	0.708
	20 – 21 Years	72	47	22	23			

	22 – 23 Years	23	14	9	0			
	24 & Above	1	0	1	0			
2	Gender							
	Male	19	9	10		2.882	2	0.237
	Female	81	17	61				
3	Hours spent in clinical practice							
	Less than 8 hours/ week	10	16	12	2	13.874	3	0.031 Significant
	8-12 hours / week	17	12	6	0			
	16-20 hours / week	18	7	10	0			
	24 hours and above / week	55	29	5	1			
4	Exposure to various Intensive care units							
	Emergency ICU	38	26	12	0	6.733	3	0.342
	ICCU- Intensive Coronary Care Unit	8	7	1	0			
	ICU	43	25	15	3			
	NICU	11	6	5	0			

Table 19 indicates that among the demographic variables (age, gender, hours in clinical practice, and exposure to various intensive care units), none show a significant association with skill scores on the use of a defibrillator for the participants in this study.

Table 19: Findings related to the association of the demographic variables with pre-test skill score of defibrillator. n=100

Sr. No.	Demographic Variable	F	Skill Score		X^2 Value	df	p-value
			Poor	Average			
1	Age						
	18 – 19 Years	4	4	0	0.544	3	0.909
	20 – 21 Years	72	67	5			
	22 – 23 Years	23	22	1			
	24 & Above	1	1	0			
2	Gender						
	Male	19	18	1	0.023	1	0.881

	Female	81	76	5			
3	Hours spent in clinical practice						
	Less than 8 hours/ week	10	29	1	0.795	3	0.851
	8-12 hours / week	17	17	1			
	16-20 hours / week	18	16	1			
	24 hours and above / week	55	32	3			
4	Exposure to various Intensive care units						
	Emergency ICU	38	36	3	1.411	3	0.703
	ICCU- Intensive Coronary Care Unit	8	7	1			
	ICU	43	40	3			
	NICU	11	11	0			

F- Frequency
χ^2- Chi- square
df- Degree of Freedom
*** Significant**

Association of the demographic variables with the pretest skills score
Findings related to the association of the demographic variables with the pretest Skills score. The calculated p-value is > 0.05, hence there was no significant association between nursing student's skills regarding skill training programme and the socio-demographic variable.

4. Discussion

Study findings revealed that students who participated in this study and received skill training program on uses of ICU devices and instruments gained significant knowledge and skills. In addition the results are supported by research study conducted by Rumysa Yousuf in 2022, on effectiveness of a skill training program focusing on Ryles tube insertion and feeding techniques among B.Sc. nursing students at Madr-e-Meharban Institute of Nursing Sciences and Research, SKIMS Soura Srinagar Kashmir, notable improvements were observed. 56.7% of the students exhibited good knowledge, which rose to 100% in the post-test. Likewise, the proficiency level enhanced from 76.7% displaying excellent skills in the pre-test to 100% in the post-test.[9]
In a recent study, proficiency in operating ventilators significantly improved after participants underwent a skill training program featuring a ventilator operation skill station. Post-test results for 100 participants showed that 5% had poor skills, 16% had average skills, and 79% demonstrated good skills. Mean skill scores increased from 3.11 ± 1.399 in the pre-test to 8.13 ± 2.214 in the post-test. Similarly, a study by Manizheh Bakhshi in 2023 found higher skill scores (29.88 ± .398 vs. 28.34 ± 1.98) with integrated simulated-practical training, indicating its effectiveness for nursing student education in ventilator operation.[10]
In the study, proficiency in operating syringe infusion pumps significantly improved following a skill training program centered around a syringe infusion pump skill station. Post-test assessment of 100 participants showed that 2% had poor skills, 23% had average skills, and 75% displayed proficient skills in operating syringe infusion pumps. Statistical analysis using a paired t-test revealed a significant enhancement in participants'

skills (t-value = 29.206, $p < 0.05$). Similarly, a study by Tobias Grundgeiger in 2022, comparing e-Learning with hands-on practice in syringe pump operation, found no significant differences in procedural skills ($p = 0.128$) or confidence levels ($p = 0.570$) between the groups. However, there was a notable decrease in confidence from immediate to follow-up sessions ($p < 0.001$). Despite this, participants generally reported higher confidence levels immediately after completing the e-Learning program compared to the subsequent follow-up session.[11]

In the study, proficiency in operating basic airway devices improved significantly after participants underwent a skill training program focused on basic airway devices. Post-test results for 100 participants showed that 1% had poor skills, 25% had average skills, and 74% had proficient skills in operating basic airway devices. Similarly, a study by Baljit Kaur in 2015 aimed to enhance the abilities of novice nursing students in airway management through simulation training. Initially, only 35% of students successfully completed basic airway management tasks, but this increased to 100% proficiency in subsequent sessions. The research highlighted the significant contribution of simulation training to experiential learning, knowledge acquisition, and skill performance in airway management among novice nursing students.[12]

In the study, proficiency in operating Intubation trolley instruments significantly improved post-training. Post-test results showed that none of the participants exhibited poor skills, with 5% achieving average skills, 84% demonstrating good skills, and 11% attaining excellent skill scores. The calculated 't' value from a paired t-test ($t = 32.069$, $p < 0.05$) underscored a substantial and statistically significant enhancement in participants' intubation trolley skills through the skill training program. Similarly, Uma Deaver's 2022 study compared conventional training (CT) and virtual-assisted training (VAT) on neonatal endotracheal intubation. Results revealed significant improvements in post-test scores within both groups, with slightly higher mean post-test practice scores in the CT group (32.47 ± 5.14) compared to the VAT group (29.61 ± 6.46). However, both methods were equally effective in enhancing nursing students' knowledge and practices regarding neonatal endotracheal intubation.[13]

In the study, proficiency in operating the defibrillator significantly improved, with 79% of participants achieving average skills and 21% exhibiting good skills in the post-test. The mean skill scores increased from 2.12 ± 3.597 in the pre-test to 7.80 ± 2.958 in the post-test. Similarly, Money Dhingra's 2022 quasi-experimental study assessed the effectiveness of simulation-based education on defibrillation. Results showed that the experimental group had higher mean post-test scores in knowledge (17.68 ± 4.37), skills (28.09 ± 4.57), and clinical decision-making ability (13.13 ± 3.74) compared to the comparison group's scores in knowledge (15.25 ± 4.95), skills (24.81 ± 5.26), and clinical decision-making ability (10.65 ± 4.36). Simulation-based learning effectively enhanced nursing students' competency in defibrillation.[14]

5. Conclusion

The primary discovery of this research indicated that nursing learners can effectively grasp the fundamental use of various tools and equipment utilized within the intensive care setting. This has the capacity to improve both their knowledge and skills concerning ICU equipment, thereby strengthening their confidence in delivering superior nursing care in hospital settings. Furthermore, by the conclusion of the skills training program, students had notably augmented their understanding of ICU instrument applications.

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