From Skills Laboratory to Hospital Duty: Nursing Students Efficacy in Vital Signs and Parenteral Drug Admin at Tobruk University

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Abstract: Background: Related Learning Experience or RLE and Intensive Nursing Practicum are courses offered in Tobruk University, College of Nursing, the former offered for 1st year and 2nd year students to prepare them for actual scenario in the hospital by practicing skills related to Nursing and Health care, the latter is exposure in hospital or clinical duty then taking a final return demonstration in the College. Aim: In this study the researchers aimed to present and analyze the efficacy of students in performing vital signs and parenteral drug administration and how much they've improved after hospital duty. The hypothesis is that there will be significant improvement from RLE to INP 1. Methods: The research used quantitative research with natural experiment design for analysis of respondent performance in RLE and INP procedures in vital signs and drug administration. Respondents were 3rd year students' of INP 1 of College of Nursing from Tobruk University. The study used the return demonstration procedure used in their final practical exam. Results: The results showed a marked improvement and significant correlation of the students' performance after hospital scenario from RLE average of 68.05 to INP 1 exam average of 72.71 and an r of 0.7151 or high correlation, overall t-test is at -5.3251 and p value of 0.0000. When grouped according to gender, male students showed no significant difference, while female students marked differently from each other in terms of overall performance using a paired t-test. Correlation is from substantial up to high on both genders. In terms of difference in variance when grouped according to students' rating both in RLE and INP the f-value and p value resulted in significant difference. Conclusion and Recommendation: The study encourage and promote team teaching in training of nursing skills in RLE thus supporting quality nursing education and patient care. Promotion of intensive training for students by nursing staff and clinical instructor in INP or hospital exposure is highly encouraged. Further and continuous study will advance a better result.
Keywords: Related Learning Experience, Vital Signs, Parenteral Drug Administration, Intensive Nursing Practicum

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I. Introduction

In nursing education, clinical learning plays a vital role in elevating clinical competences of nursing students as it provides an anticipatory knowledge of the organizational contexts in which nursing care is delivered [1, 2]. The significance of team teaching, practical return demonstration, and hospital exposure towards excellent clinical nursing practice were recognized by nursing students [3]. Appropriate nursing care for patients needs intensive practice [4]. Suitable management of measurement and medication is an essential aspect of nursing practice to avoid problems or complication with the patients [5, 6]. In academic setting, team teaching is ideal where assigned teachers actively share the instruction of content and skills to their students', they also accept equal responsibility for the education of all students and are dynamically involved throughout the class period [7]. To improve performance in the hospital students must be exposed to practical demonstration in the classroom laboratory [8]. Continuous experiences of the student nurses' in a variety of practical learning strategies is an effective means of acquiring needed skills set to increasing knowledge, skills, attitude and values to become an excellent nurse practitioner [3]. Students should be able to apply things learned at school in hospital scenario and must be able to exercise the procedure they performed in the school laboratory [9]. The strategies of team teaching are having a group of teachers who work together in planning, conducting and evaluating the learning activities for the same group of learners or to put it simply a team work between two qualified instructors together making presentations to the class [3]. The advantage of using team teaching strategy includes: having various teaching styles and activities presented to the learners, and having more time for one on one and small group instruction [10]. Preparation and planning to stimulate student in learning experience should be used as teachers approach [11]. If the Practical Return Demonstration demonstrated by the

clinical instructor on the procedure in nursing laboratory is followed up with return demonstration of the nursing students, it would emphasize greater understanding to the purpose and responsibility of a nurse on why taking care of the patient is important [3]. In Tobruk University this is performed in RLE or Related Learning Experience, a course offered for 1st and 2nd year students for 4 semesters where they were trained before doing clinical practice in their higher year and hospital scenario. Clinical duty is then performed in 3rd year to 4th year starting with INP 1.

RLE is a course performed in classroom or laboratory to practice nursing skills in preparation for INP. INP 1 is the hospital duty offered in 3rd year 1st semester class m mostly in clinical settings. The focus of INP 1 is measuring of vital signs and parenteral drug administration also known as injection using a needle and a syringe [4]. There are 7 main procedures the student must master to finish the course; measuring temperature, pulse rate and respiratory rate (TPR), measuring blood pressure, withdrawing medication from a vial, withdrawing medication from ampule, intradermal injection, intramuscular injection and subcutaneous injection. Basis of students' performance and procedures followed in these skills were adapted from Delmar's [4]. Measuring TPR is critical as monitoring body temperature is a basic skill in nursing and medical decision making, because when body temperature rises above the normal range, pyrexia (fever) occurs and when the body is exposed to temperatures lower than normal for a prolonged length of time, hypothermia occurs [12]. Pulse assessment to patient is the measurement of a pressure pulsation created when the heart contracts and ejects blood into the aorta [12]. Respiratory assessment is the measurement of the breathing pattern of a person [12]. Blood pressure measurement is performed during a physical examination, at initial assessment, and as part of routine vital signs assessment common method requires use of the sphygmomanometer and stethoscope for auscultation and palpation as needed [4]. An intradermal injection is a method used to administer medications just below the skin, given for slow absorption of potent medication due to the less richly supplied blood vessels of this layer [4]. Intramuscular injection is a method used to administer medications into the deep muscle tissue for the purpose of quick absorption due to the richly supplied blood vessels in the muscle [13, 14]. A subcutaneous injection is a method used to administer medications into the loose connective tissues just below the dermis of the skin, given especially if medications do not need to be absorbed as quickly as those given intramuscularly due to the less richly supplied blood vessels in the subcutaneous tissue [15]. Before injection was to be administered to patients, the students or practitioners must withdraw medication from a vial or ampoules. Vials are often used to package multi-dose or single-dose parenteral medication; it is a small glass bottle with a rubber seal at the top [15]. Ampoules (also spelled ampule) are containers that hold a single dose of medication; it was made of clear glass and have a distinctive shape with a constricted neck [15]. Currently to assess the students the clinical instructor uses a checklist of procedures, rating every step from 3 as highest score and 0 as the lowest. Then it was tallied to get a sum, divide it to the number of items to get performance grade for each skill. All 7 procedures will then be computed for its average and will be recorded as their final practical exam for the course INP 1.

In this study the researchers aimed to present and analyze the efficacy of students in performing vital signs and parenteral drug administration and how much they've improved after hospital duty. The recorded data would be treated statistically to find the average score, standard deviation and adjectival rating. To test the difference of the mean score between RLE and INP exams an independent t-test and p-value would be computed. To test the difference of variance between the students rating, one way ANOVA will be utilized. The hypothesis of the study is that there will be improvement in students' performance after exposure from hospital duty. The research will be limited to 3rd year students of the College of Nursing in Tobruk University.

II. Materials And Methods

The research used quantitative research with natural experiment design for analysis of respondent performance in RLE and INP procedures in vital signs and drug administration. Population assessment respondents will be the 3rd year students of INP 1 of College of Nursing from Tobruk University. The study used the return demonstration procedure used in their final practical exam. The study aims to find out the nursing student's improvement in performing vital signs and parenteral drug administration after they were exposed in Hospital duty for one semester.

2.1 Study Population

The respondents consisted of 106 nursing students who recently took INP 1 course from 3rd year. The whole 3rd year class who attended the hospital duty from 1st semester of school year 2017-2018 including taking the final exam was utilized in the study. To determine their current efficacy the study will present their performance in the return demonstration exam. To qualify as respondents the students must be currently in 3rd year level, took the INP 1 exam and with an existing record in RLE 2, 3 and or 4 from 1st year and 2nd year.

2.2 Research Tools/Instrument

The researcher uses a clinical instructor made procedure currently used as a checklist/evaluation tool for INP 1 which focuses on vital signs and parenteral drug administration. There are 7 procedure being performed, measuring TPR (temperature, pulse rate and respiratory rate), measuring blood pressure, withdrawing medication from a vial, withdrawing medication from ampule, intradermal injection, intramuscular injection and subcutaneous injection.

2.3 Data Measures

To permit ease of analysis collected data were tallied and organized into tables. Frequency distribution is used to count the number of respondents on the equivalent rating. Measures of central tendency like weighted mean and standard deviation were used to look for variation in the relative contribution of individual data values to the mean. Independent paired t-test and Pearson product moment coefficient was used to compare the means of efficacy between their previous performance on the same procedure from RLE exam and after the hospital duty through INP exam. ANOVA was used to get the difference in the variance when grouped according to rating.

The computed mean were also analyzed with the use of an interpretation with specific mean score ranges and a subsequent adjectival interpretation. Shown below is the interpretation used for the study.

Table 1: Interpretation of Student's Efficacy in Vital Sign and Parenteral Drug Administration

Range	Adjectival Interpretation
90 - 100	Excellent
80 – 89	Very Good
70 – 79	Good
60 – 69	Passed
50 – 59	Needs Improvement
Below 50	Poor

2.4 Software Tools

The researchers used Microsoft Excel as a tally sheet and permit the data to be computed using function average for mean, stdev for standard deviation sample size. Tallied values also underwent data analysis tool pack to get the difference of mean between RLE and INP exam using paired t-test, correlation and one way ANOVA.

III. Results

Collected data were structured using table to permit ease of investigation. Frequency distribution, measures of central tendency like weighted mean and standard deviation were presented together with equivalent adjectival rating for the student's efficacy in vital signs and parenteral drug administration. For comparison of data between RLE and INP exam of students, paired t-test and p value were used.

3.1 Frequency Distribution and Weighted Mean of Respondents

Table 2: Frequency Distribution of Students Rating in Vital Signs and Parenteral Drug Administration

Rating	RLE (Pre)				INP (Post)			
	f	%	WM	SD	f	%	WM	SD
Excellent (90 – 100)	4	7.27	91.64	2.33	11	20.00	93.55	5.45
Very Good (80 – 89)	13	23.64	83.74	2.14	21	38.18	83.69	10.67
Good (70 – 79)	29	52.73	74.67	2.48	31	56.36	74.42	14.03
Passed (60 – 69)	32	58.18	65.31	2.81	28	50.91	64.01	16.13
Needs Improvement (50 – 59)	21	38.18	56.90	2.33	14	25.45	55.20	11.47
Poor (Below 50)	7	12.73	43.98	4.82	1	1.82	43.14	-
Overall	106	100	**68.05**	11.69	106	100	**72.71**	12.14

A total of 106 students from 3rd year took the final return demonstration in INP 1, and for the purpose of the study retrieved their performance in their RLE years from 1st and 2nd year. Table 2 shows the frequency distribution of students based on rating (from table 1), and results indicate an improvement both in frequency and overall mean. The number of excellent students rose from 4 in RLE days to 11 after the INP exam and a weighted mean of 91.64 to 93.55 respectively. Despite a slight reduction in mean of very good students from 83.74 to 83.69, the frequency rose from 13 to 21. Good rating frequency is from 29 to 31 and mean of 74.67 to

74.42, passed from 32 to 28 and mean of 65.31 to 64.01. A decreased in frequency from 21 to 14 is recorded in needs improvement rating and mean score of 56.90 to 55.20 while the number of poor students decreased from 7 to 1 with a mean of 43.98 down to 43.14. Getting the overall mean the RLE performance of 68.05 or passed rose to 72.71 or good in INP 1 indicating improvement in performance. In terms individual performance, 74 students out of 106 increased their average score, 31 with a decreased average and 1 of them remained the same.

3.2 Differences in Responses of Paired Mean

Table 3: Weighted Mean of Students Efficacy in Vital Signs and Parenteral Drug Administration

Procedure	RLE (Pre)		INP (Post)		T Test	P Value	r	Correlation
	WM	SD	WM	SD				
Vital Signs (TPR)	63.92	15.76	65.45	20.59	-0.7106	0.4789	0.2708	Low
Measuring Blood Pressure	72.82	15.04	77.39	14.52	-2.7215	0.0076*	0.3174	Low
Intradermal Injection	60.32	20.47	71.23	14.70	-6.2828	0.0000*	0.5246	Substantial
Withdrawing Medication From Ampoule	75.88	12.99	76.73	15.34	-0.5520	0.5821	0.3846	Low
Subcutaneous Injection	68.43	13.62	78.49	15.23	-7.3280	0.0000*	0.5252	Substantial
Withdrawing Medication From A Vial	65.98	16.52	63.71	18.30	1.0379	0.3017	0.1642	Negligible
Intramuscular Injection	69.00	19.19	75.95	18.92	-3.6022	0.0005*	0.4563	Substantial
Overall Performance	68.05	11.69	72.71	12.14	-5.3251	0.0000*	0.7151	High

*Significantly Different Based On 95% Level of Confidence

To test the significant difference in RLE and INP performance of students, a paired t-test was used in table 3 together with Pearson product moment coefficient to find correlation. All procedures showed an increased performance, except for withdrawing medication from a vial with a slight decrease in mean of 65.98 in RLE to 63.71 in INP 1, although no significant difference was found after comparing the mark, it also shows negligible correlation. Vital signs (TPR): from 63.92 to 65.45, withdrawing medication from ampoule: 75.88 to 76.73 both recorded no significant difference and low correlation despite an increase in mark. In terms of measuring blood pressure: 72.82 to 77.39, intradermal injection: 60.32 to 71.23, subcutaneous injection: from 68.43 to 78.49, and intramuscular injection: 69.00 to 75.95 in mean, all recorded an increase in mean with significant difference based on t-test and p value, although correlation varies from low to substantial. Getting the average of all procedures, the students performed better in INP 1 than in their previous exam in RLE with an extremely significant difference in mean with t-test value of -5.3251 an p value of 0.0000, and high positive correlation with r value of 0.7151. The result showed that there is a big improvement in students' performance when they are exposed in hospital duty and good performing students in RLE remained better performers in INP. The continuous experiences of the student nurses' in a variety of practical learning strategies is proven to be an effective means of acquiring needed skills set to increasing knowledge, skills, attitude and values to become an excellent nurse practitioner [1].

3.3 Differences in Paired Responses by Gender

Table 4: Differences in Paired Responses On Female Students

Procedure	RLE (Pre)		INP (Post)		T Test	P Value	r	Correlation
	WM	SD	WM	SD				
Vital Signs (TPR)	63.15	16.11	64.23	20.43	-0.4659	0.6424	0.2897	Low
Measuring Blood Pressure	72.43	15.49	77.21	14.92	-2.6043	0.0108*	0.3375	Low
Intradermal Injection	59.88	21.14	71.48	14.08	-6.0844	0.0000*	0.5277	Substantial
Withdrawing Medication From Ampoule	76.41	13.22	76.51	15.56	-0.0606	0.9518	0.4244	Substantial
Subcutaneous Injection	68.43	13.52	78.84	15.21	-7.3114	0.0000*	0.5589	Substantial
Withdrawing Medication From A Vial	66.37	16.98	64.21	19.06	0.8796	0.3814	0.1548	Negligible
Intramuscular Injection	69.12	19.82	77.49	18.26	-3.9263	0.0002*	0.4315	Substantial
Overall Performance	67.97	12.04	72.85	12.25	-5.1113	0.0000*	0.7186	High

N=91, *Significantly Different

The performance mean of female students in all procedures increased except for withdrawing medication from a vial similar to the combined result with no significant difference and negligible correlation. The overall mean rose from 67.97 to 72.85 with an extremely high significant difference and a positive high correlation result of 0.7186. Looking at the performance per procedure, there are some slight variations in t-test, p value and r value compared to the combined result though the adjectival rating and correlation were the same, were significant difference was found in measuring blood pressure, intradermal injection, subcutaneous

injection and intramuscular injection, while correlation result was the same from low to substantial. With 91 respondents in this group, the frequency largely affects the overall result.

Table 5: Differences in Paired Responses on Male Students

Procedure	RLE (Pre)		INP (Post)		T Test	P Value	r	Correlation
	WM	SD	WM	SD				
Vital Signs (TPR)	68.53	12.93	72.87	20.66	-0.6926	0.4999	0.0123	Negligible
Measuring Blood Pressure	75.20	12.10	78.47	12.19	-0.7775	0.4498	0.1025	Negligible
Intradermal Injection	63.00	16.14	69.67	18.52	-1.6497	0.1212	0.5997	Substantial
Withdrawing Medication From Ampoule	72.67	11.38	78.07	14.36	-1.2127	0.2453	0.1169	Negligible
Subcutaneous Injection	68.47	14.71	76.40	15.70	-1.7550	0.1011	0.3387	Low
Withdrawing Medication From A Vial	63.60	13.66	60.67	12.90	0.6909	0.5009	0.2347	Low
Intramuscular Injection	68.27	15.36	66.60	20.80	-0.4473	0.6615	0.7206	High
Overall Performance	68.53	9.63	71.82	11.81	-1.5024	0.1552	0.7054	Substantial

N=15, *Significantly Different

The performance mean of male students in all procedures increased except for withdrawing medication from a vial and withdrawing medication from a vial unlike the result form combined and female results. The overall mean rose from 68.53 to 71.82 with no significant difference in mean and a substantial correlation with r of 0.7054. Based on t-test and p value no procedure recorded significant difference in mean and a variation in r value showed the correlation to be from negligible to high, slightly different from the result of female group. With only 15 respondents in this group, the frequency and mean has little effect in the overall result.

Table 6: Differences in Variance Grouped According to Rating

Procedure	Rating	WM	Variance	F-Value	P < 0.05
Overall Performance RLE (Pre)	Excellent (90 – 100)	91.64	5.422	369.4016	0.0000*
	Very Good (80 – 89)	83.74	4.598		
	Good (70 – 79)	74.67	6.156		
	Passed (60 – 69)	65.31	7.902		
	Needs Improvement (50 – 59)	56.90	5.421		
	Poor (Below 50)	43.98	23.221		
Overall Performance INP (Post)	Excellent (90 – 100)	93.55	6.2605	379.6178	0.0000*
	Very Good (80 – 89)	83.69	5.3360		
	Good (70 – 79)	74.42	7.5575		
	Passed (60 – 69)	64.01	8.8110		
	Needs Improvement (50 – 59)	55.20	10.8154		
	Poor (Below 50)	43.14	-		

*Significantly Different

Table 6 shows the difference in variance or ANOVA when grouped according to rating both in RLE and INP. With an F-value of 369.4016 and 379.6178 and p value below way below the 0.05 level, the statistics resulted in a significant difference when grouped according to students rating.

IV. Discussion

As shown in Table 2 the overall performance of students in their RLE years is equivalent to 68.05 or right at the passing mark similar to a recent study conducted to lower year level [15] sans measuring TPR and BP. The rating indicates that the students are well enough to perform the procedure but may need more practice since all procedures are sensitive and might affect patient care [15]. With an improvement in overall performance of their INP 1 at 72.71, or from passed to good in terms of rating it proves that the continuous experiences of the student nurses' in a variety of practical learning strategies is proven to be an effective means of acquiring needed skills set to increasing knowledge, skills, attitude and values to become an excellent nurse practitioner [1]. Since RLE is a University based practice we could consider it as an academic performance for students. The academic performance in the form of RLE of 3rd year BS Nursing students of Tobruk University College of Nursing correlates well (r=0.7186) with their Clinical Performance or INP 1 as shown in Table 3, similar to the result of academic and clinical performance correlation performed to students from 2014 [2], with a significant difference of paired mean from RLE to INP 1 (t-test=-5.3251, p value=0.0000). This indicates that students' who perform well in academics rate as well also in their clinical focus, which may be attributed to their increased appreciation of nursing as they reach a higher year level [2]. Good performing student in academics will most likely to perform better in clinical setting as students which possess mastery on the subject matter tend to be more elaborative on his approach [16]. Despite the positive correlation result of the study the

academic and clinical performance grades of students are susceptible to rater bias since different clinical instructors assess the performance of students in the different specializations and in the different clinical areas [2] as well as different clinical instructors were used in different procedure evaluation.

The overall mean of female students in RLE is 67.97 and INP at 72.85, while male is 68.53 for RLE and 71.82 for INP 1 as revealed in table 4 and 5. The two grouped performed statistically the same [2]. Although the t-test was performed as paired mean, whereas the male performance from RLE to INP 1 doesn't differ significantly while the female has a marked improvement causing significant difference in the paired mean (t-test=-5.1113, p value=0.000). The frequency of female students over the male [17] with 91 and 15 respectively might have affected the result. Though in terms of correlation the rating is from substantial to high (male r=0.7054, female r=0.7186). This means that Academic performers tend to practice more compared to poor performers [2], resulting in a higher correlation of RLE and INP 1. The excerpt "Applying classroom concepts to actual practice as an exciting and anticipated part of the curriculum for young, eager nursing students, they arrive with theory, knowledge, and simulated laboratory experience, ready to practice nursing skills on real patients" [18] might be attributed to the result. Despite this reason, the biggest impediment in clinical practice would be students' lack of interest and motivation in the clinical setting [19]. Similarly, academic performance must be validated by a standardized examination for students based on College-identified core competencies [2]. In terms of rater biases, a well-designed clinical assessment tool for student's clinical performance including case study and objective clinical structure exam will be a fair and reliable method to use [20]. Evidence also implied that educational intervention improved clinical competence of practitioners [21].

Both RLE and INP 1 performance showed a significant difference in variance as shown in Table 6 when grouped according to rating. The student group with poor performance tends to have the highest variance while the upper group had lower variance [15]. The F-value of 369.4016 and 379.6178 for RLE and INP 1 respectively resulted in p value of 0.0000 or an extreme significant difference.

V. Conclusion

The study presented the result of student evaluation in vital signs and parenteral drug administration through final return demonstration exam from RLE and INP 1. The statistical results shows that the students performed generally well in all procedures with an average score above the passing mark. It shows a marked improvement in overall performance from 68.05 in RLE courses to 72.71 in INP 1 exam with an extremely high p value rating of 0.0000 denoting progress in overall mean for a paired t-test. The r value is at 0.7151 or high correlation supporting a notion that the student who performed well in RLE remains a better performer in INP. No significant difference were seen when students were grouped according to male gender but significant difference were observed in female students' performance. Correlation remains from substantial and high respectively in male and female student. The variance proved to be significantly different based on ANOVA when the students are grouped according to rating. Overall the study proved that hospital exposure will increase students' performance in nursing procedures proving the hypothesis. The collected data can be used to improve quality of nursing education by enhancing student's weak points through proper and extensive training and complementing their strong area in the area of vital signs and parenteral drug administration.

VI. Recommendation

The researchers recommend further study to address factors that may affect the result. More respondents and including other School year level and nursing procedures from higher year of INP be integrated in the study for comparison purposes would advance the result. It is suggested that the faculty members ensure adequate training and proper education in RLE subjects and encouraged intensive training approach by the clinical instructors and hospital staff nurses assigned to students in INP courses to ensure quality nursing education and quality nursing care on patients. Based on the findings and conclusion, the College of Nursing of Tobruk University should enhance the RLE curriculum for the students to improve their skills before they will be exposed for their hospital duty with more time for students to enhance their skills [17]. It is also recommended to the University administration to address the lack of clinical instructor assigned in RLE and INP by hiring more personnel with high qualification. In addition, the College of Nursing should have virtual laboratory for the students with laboratory equipment, supplies and models to enhance the skills of the students [17]. The University should put up library with learning / teaching materials like nursing books [17], internet connection and nursing journals.

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