

## Second Year Nursing Students' Efficacy in Parenteral Drug Administration at Tobruk University

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### **Abstract:**

**Background:** Related Learning Experience 3 or RLE 3 is a course in College of Nursing at Tobruk University offered to 2<sup>nd</sup> year 1<sup>st</sup> semester class. Parenteral drug administration is the core procedure of the subject.

**Aim:** This research aimed to present and analyze the efficacy of students in performing parenteral drug administration and the difference when grouped. The null hypothesis is that there will be no significant difference between repeater students and regular students.

**Methods:** The research used quantitative research with natural experiment design for analysis of respondent performance in RLE 3 parenteral drug administration. Respondents were 2<sup>nd</sup> year students' of RLE 3 of College of Nursing from Tobruk University. The study used the return demonstration procedure used in their final practical exam.

**Results:** The results showed that the students' exam result at 64.11 was passed/fair mark indicating that the students are competent enough to perform the procedure. When grouped between repeater and regular students, the weighted mean of 62.86 and 64.54, a t-stat of -0.75901, and p-value of 0.453402, shows no significant difference among the group.

**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' clinical instructor in RLE is highly encouraged. Further and continuous study with bigger sample size will progress to a better result.

**Key Word:** Related Learning Experience, Parenteral Drug Administration, Vial, Ampule, IV, SubQ, IM

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Date of Submission: 01-02-2023

Date of Acceptance: 11-02-2023

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### I. Introduction

RLE 3 is a course performed in classroom or laboratory to practice nursing skills in preparation for INP. This course is offered to 2<sup>nd</sup> year students during the 1<sup>st</sup> semester of the school year [1]. There are 6 main procedures the student must master to finish the course; withdrawing medication from a vial, withdrawing medication from ampule, intradermal injection, intramuscular injection subcutaneous injection and IV priming. The basis of students' performance and procedures were adapted from Delmar's following a certain skill set [2]. The following procedure were described as follows, starting with withdrawing medication; before injection was to be administered to patients, the students or practitioners must withdraw medication from a vial or ampules [3]. Often used to package multi-dose or single-dose parenteral medication; vial is a small glass bottle with a rubber seal at the top [4]. Ampules (or ampoules) are containers that hold a single dose of medication; it was made of clear glass and have a distinctive shape with a constricted neck [4]. On the injection side, 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 [2] while 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 [5, 6]. Subcutaneous injection on the other hand 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 [4]. Adding to this is IV priming referring to by placing IV fluid in IV tubing to remove all air prior to attaching the IV tube to the patient [2], this procedure is done to prevent air from entering the circulatory system. Proper management of measurement and medication is a crucial aspect of nursing practice to avoid problems or complication with the patients [7, 8]. These procedures in the laboratory practice are vital as 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 in nursing education [3, 9, 10, 11]. Correct nursing care for patients needs intensive practice [2] as well.

At present assessment of students involves the clinical instructor using a checklist of procedures, rating every step from 3 as highest score and 0 as the lowest [3, 10]. It was tallied to get a sum, divide it to the number of items to get performance grade for each skill. All 6 procedures will then be computed for its average and will be recorded as their final practical exam for the course RLE 3. This consist of 40% of the final grade of the students. Before final exam, the students undergone team teaching from the faculty members. Team teaching is ideal in academic setting, when assigned teachers actively share the instruction of content and skills to their students', also accepting equal responsibility for the education students and dynamically involved throughout the class period [12]. Students must be exposed to practical demonstration in the classroom laboratory to improve performance in the hospital [13]. Preparation and planning is essential to stimulate student in learning experience as a teachers approach [14] bytaking advantage of using team teaching strategy which includes among others: having various teaching styles and activities presented to the learners, and having more time for one on one and small group instruction [15, 16]. By these students would be able to apply things learned at school in hospital scenario and must be able to exercise the procedure they performed fromthe school laboratory [17]. At 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 [10].

The objective of the study is to find out the nursing student's performance on parenteral drug administration. Scope of the study includes the 2<sup>nd</sup> year students' final return demonstration exam in RLE 3. Expected result of the study is to show that the students are competent in parenteral drug administration and fit to work as nurses in the future. The research will be limited to 2<sup>nd</sup> year students of the College of Nursing in Tobruk University.

## II. Material And Methods

This quantitative research with natural experiment design was carried out on 2<sup>nd</sup> Year students of College of Nursing at Tobruk University, Tobruk, Libya on their scheduled final return demonstration exam on January of 2023. A total of 63 students took the exam and were included in the study.

### Study Population

The respondents consisted of 63 nursing students who recently took Related Learning Experience 3 course from 2<sup>nd</sup> year class. The whole 2<sup>nd</sup> year class who attended the RLE 3 for Academic year 2022-2023 and took 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 2<sup>nd</sup> year level, they will be divided into two groups, Repeater, who repeated their 1<sup>st</sup> year class once and Regular who never repeated their 1<sup>st</sup> year class.

### Research Tools/Instrument

The researcher uses a clinical instructor made procedure currently used as a checklist/evaluation tool for RLE 3 which focuses on parenteral drug administration. There are 6 procedures performed, withdrawing medication from a vial, withdrawing medication from ampule, intradermal injection, intramuscular injection, subcutaneous injection and with the addition of IV priming.

### Data Measures/Statistical Analysis

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 was used to compare the means of efficacy between two groups, Repeater and Regular students. ANOVA was used to get the difference in the variance when grouped according to rating. Differences between genders were not performed due to an almost homogenous quantity of female data.

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 Parenteral Drug Administration

Range	Adjectival Interpretation
80 – and above	Very Good
70 – <80	Good
60 – <70	Passed
50 – <60	Needs Improvement

Below 50	Poor
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### Software Tools

Microsoft Excel was used by the researchers as a tally sheet and data was using function average for mean, stdev for standard deviation. Talled values also underwent data analysis tool pack to get the difference of mean between RLE 3 exam using t-test, and one way ANOVA, employing some help from Minitab statistical version 17 to double check statistical results.

### III. Result

Data collected 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 parenteral drug administration. For comparison of data t-test, ANOVA and p value were used.

#### Frequency Distribution and Weighted Mean of Respondents

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

Rating	f	%
Very Good (80 – and above)	2	3.17
Good (70 – 79)	13	20.63
Passed (60 – 69)	25	39.68
Needs Improvement (50 – 59)	22	34.92
Poor (Below 50)	1	1.59
Total	63	100

As shown on table 2, the highest rating of very good, has 2 students, while 1 scored poor the lowest in the class. For other rating, there are 13 students who got a good mark, 25 has a passed/fair mark and 22 of the students' needs improvement. The data reflected in the study is only 40% of their final grade, results may differ after adding the other 60% from their class standing marks. Since the purpose of this study is efficacy/performance of students on parenteral drug administration, final exam as formal gauge of performance, was used as data for the study.

#### Weighted Mean of Respondents

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

Procedure	WM	SD	Adjectival Rating
Withdrawing medication from a vial	59.43	17.43	Needs Improvement
Intramuscular injection	71.32	19.08	Good
Withdrawing medication from ampule	67.94	13.17	Passed/Fair
Subcutaneous injection	63.08	12.80	Passed/Fair
Intradermal injection	54.00	68.92	Needs Improvement
IV Priming	68.92	11.07	Passed/Fair
Overall Performance	64.11	14.16	Passed/Fair

Table 3 shows the performance of students for every procedure as well as overall performance. The highest rating was found in performing Intramuscular injection with a weighted mean of 71.32. Getting a passed/fair result was found on withdrawing medication from ampule, administering subcutaneous injection and IV priming with 67.94, 63.08 and 68.92 respectively. On the other hand, the students will need more improvement in terms if withdrawing medication from a vial and intradermal injection with 59.43 and 54.00 average. Overall performance is at far on passing mark with 64.11 showing the overall competency of students when all procedures were performed. 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 [9].

**Differences in Responses**

**Table 4: Differences in Responses between Repeater and Regular Students**

Procedure	Gender	WM	Variance	t-stat	p value
Withdrawing medication from a vial	Repeater	56.00	16.34	-0.94938	0.350551
	Regular	60.60	17.80		
Intramuscular injection	Repeater	64.13	22.21	-1.57792	0.128856
	Regular	73.77	17.49		
Withdrawing medication from ampule	Repeater	70.75	12.49	1.0243	0.314462
	Regular	66.98	13.38		
Subcutaneous injection	Repeater	63.81	10.23	0.303201	0.763532
	Regular	62.83	13.66		
Intradermal injection	Repeater	51.00	14.94	-0.95593	0.348639
	Regular	55.02	13.25		
IV Priming	Repeater	71.50	8.31	1.281123	0.208122
	Regular	68.04	11.81		
Overall Performance	Repeater	62.86	7.14	-0.75901	0.453402
	Regular	64.54	8.88		

The mean score between grouped differs slightly, regular student performance was slightly compared to that of repeaters', with 64.54 and 62.86 respectively, t-stat score is -0.75901 resulting in a p-value of 0.453402, showing no significant difference between the group. Looking at each procedure Regular students' edge Repeater in Withdrawing medication from a vial 60.60 over 56.00, intramuscular injection with 73.77 against 64.13 and intradermal injection at 55.02 and 51.00. The p-value results in 0.350551, 0.128856 and 0.348639 respectively showing no significant differences between the two groups. On the other note, repeaters was slightly ahead against regular students in terms of withdrawing medication from ampule with 70.75 and 66.98, subcutaneous injection at 63.81 and 62.83, and IV priming scoring 71.50 and 68.04, while the p-value were 0.314462, 0.763532 and 0.208122, showing no significant differences at 95% confidence interval. The result denotes that either group performed on a similar level.

**Table 5: Differences in Variance Grouped according to Rating**

Procedure	Rating	WM	Variation	F-value	p < 0.05
Overall Performance	Very Good	86.50	37.56	116.0249	<0.000001
	Good	73.10	4.77		
	Passed/Fair	65.71	9.21		
	Needs Improvement	55.67	9.21		
	Poor	48.33	-		

Table 5 shows the difference in variance when grouped according to rating. Higher variance were observe for those with a rating of very good, that may be a result of higher interval of 20pts as compared to the usual 10pts for other ratings. Poor shows no variance because there only 1 student. The F-value was 116.0249 and p value at<0.000001, significant difference were observed when grouped according to rating.

**IV. Discussion**

The overall result as shown of table 2 states that the performance of 2nd year students in parenteral administration is 64.11, in a similar study on 2017-2018, the 2<sup>nd</sup> year students got 67.88, slightly higher than the present study [11]. Both 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 [11] when they perform it in the hospital. Changes on the overall mean may also be affected by the addition of IV priming, which were not present in the previous study. 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 [2, 9] so it must be put into practice. Despite the lower rating by the students in the present study, there is only one who performed poorly as compared to 5 students in the past, although more students have gotten very good rating before. 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 [10]. The current study also shows that the present students performed better in terms of intramuscular injection and withdrawing medication from ampule [11], although performed lesser in the rest of the procedures. The result of the study on 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 different clinical areas [9]. Another factor would

be 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 [4]. 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] must be ingrained to the students and clinical instructors alike. Academic performance must be corroborated by a consistent examination for students based on College-identified core competencies [3, 10]. With that in mind, it must also be reminded that the biggest impediment in clinical practice would be students' lack of interest and motivation in the clinical setting [19]. 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 in the classroom/laboratory setting [20] and future research as well. Through evidence based practice, it may also imply that educational intervention may improve clinical competence of practitioners [3, 21]. The differences in responses from both previous and current study also indicates that there is no significant difference when grouped, although the grouping was not identical, gender base on the older study and academic year attendance for the current study. The variance when grouped according to rating both shows a high F-value, resulting in a p-value of <0.000001 [2, 11]. Further study on the same subject is recommended in the future.

## V. Conclusion

The study presented the result of student evaluation by final return demonstration exam in parenteral drug administration from RLE 3. The statistical results shows that the students performed generally well in all procedures with an average score of 64.11, well above the passing mark. It shows no significant difference when grouped according to repeater and regular students. The variance proved to be significantly different based on ANOVA when the students are grouped according to rating. Overall the study proved that the students are competent in parenteral drug administration and fit to work as nurses in the future. 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 parenteral drug administration [3, 11].

## VI. Recommendation

The investigators recommend additional study to address factors that may affect the result. More respondents and including other School year level and nursing procedures from RLE 1 to RLE 4 would enhanced 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 to ensure quality nursing education [11] and quality nursing care on patients when they reach clinical duty. Centered on the findings and conclusion, Tobruk University College of Nursing should enhance the RLE curriculum for the students to improve their skills before they'll be exposed for their hospital duty with more time for students to improve their skills [3, 11]. University administration must also address the lack of clinical instructor assigned in RLE 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 their skills [3, 11]. Library with learning / teaching materials like nursing books, internet connection and nursing journals must also be put up [3, 11].

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Dorothy G. Buhat-Mendoza, et. al. "Second Year Nursing Students' Efficacy in Parenteral Drug Administration at Tobruk University." *IOSR Journal of Nursing and Health Science (IOSR-JNHS)*, 12(1), 2023, pp. 33-38.