

Self-based Learning Compared to Didactic Learning for Basic Medical or Surgical Technical Skills

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Abstract

This randomized controlled study compared self-based learning (SBL) to didactic learning (DL) in teaching medical students medical and surgical skills. Self-based learning is at least as good as didactic learning in teaching medical students. The skills used were IV line insertion and simple interrupted suture. Sixty-four consenting second year medical students were randomly divided into two groups of 32 students each. For the IV line insertion activity, Group 1 was given a short didactic lecture on IV line insertion and Group 2 received a self-based learning task. Both groups were assessed a week later for IV line insertion on a dummy. Then the two groups were crossed over, where Group 2 attended a short didactic lecture and Group 1 underwent a self-based learning task on simple interrupted suturing. Both groups were assessed a week later using a suturing pad model. Statistical analysis of data, collected from assessment forms and questionnaires, was done using χ^2 test (chi-square test). The results showed that there was no significant difference between the two groups in terms of their performance assessment, for both skills. However, student satisfaction significantly differed between the two groups with the SBL group expressing higher overall satisfaction in both activities. Self-based learning should be integrated in medical curricula since its comparable to didactic learning in terms of students' performance and leads to higher student satisfaction.

Keywords: Medical students, suturing, IV line, self-based, didactic.

1. Introduction

There is an increasing trend toward self-based learning in medicine such as problem based learning (PBL) (1, 2). Several studies compared self-based learning to didactic lectures, showing its superiority in theoretical learning (3, 4). However, very few studies have addressed the effect of self-based learning on acquiring medical or surgical technical skills by medical students. Shanks et al. showed that self-regulated learning, which is defined as a process involving self-generated thoughts, feelings, and actions that are

planned and cyclically adapted to ensure the attainment of personal goals, is an effective method of procedural skills training (5).

Simple stitch technique or intravenous line insertion technique are basic skills that are frequently used by physicians. Brandt et al. studied the skill of surgical knot tying in medical students (6). Students were divided into two groups; the first group received a computer-based self-directed learning approach and the second group; a didactic lecture-based teaching method. Their results showed that self-directed learning was as effective as and more practical than the traditional lecture-based learning, since students in both groups tied a similar number of surgical knots. However, those who did not receive didactic lectures were able to acquire the skill with fewer attempts and became more proficient at faster tying of a surgical knot (6).

Another study assessed self-based learning in residency training years (7). In this study, Brydges et al. evaluated the effectiveness of directed self-regulated learning and instructor-regulated learning, respectively, for teaching lumbar puncture using simulation in internal medicine residents in their first year of postgraduate studies. Authors hypothesized that trainees should be given an active role in the process of their learning. The results showed that in the short term, both types of learning were comparable but in the long term, the group that experienced directed self-based learning was more confident and better equipped to perform the procedure. Moreover, in addition to the long-term benefit of self-regulated learning, adopting this strategy would be a step towards solving the problem of limited faculty staff time (7).

Hayashi et al. compared tutored and tutorless PBL sessions in first-year medical students and concluded that tutorless PBL is an efficient way to reduce the demands on faculty resources and time (8). In fact, both groups had comparable results in the written examinations at the end of the study but the students who were part of the tutored group reported better satisfaction and contentment with their learning experience.

Students' satisfaction was studied by Bradley et al., who compared students' experiences of directed and self-directed learning in evidence-based medicine (9). Their results showed that a higher proportion of the directed-learning students evaluated their program positively in comparison with the self-directed group. But the authors recognized limitations in their study related to students' attendance rates and their ability to adapt to a self-directed program (9).

Engum et al. studied intravenous line insertion in nursing students and medical students (10). In this study, the students were exposed to virtual reality self-based learning or to didactic lecture. The results showed that students preferred the didactic method with tutor and plastic mannequins.

The aim of this study is to compare self-based learning (SBL) to didactic learning (DL), in medical students' acquisition of medical and surgical technical skills. The medical and surgical skills used are IV line insertion and simple interrupted suture. This study is important because unlike the impact of SBL on theoretical learning, not much literature is available on the effect of self-based learning on acquiring medical or surgical technical skills.

2. Methods

2.1 Subject selection

Second year medical students at the American University of Beirut (AUB) were chosen as the study population, as up to this point in the medical school they are not exposed to any medical or surgical skill techniques. This allowed a non-biased comparison amongst the second year medical students as compared to third and fourth year medical students or resident physicians. In addition, second year students are not segregated into different rotations and have the same classes at any given point in the year, reducing the bias coming from learning in different rotations.

2.2 Ethics Statement

The American University of Beirut's Institutional Review Board approved this study. All research was conducted at the American University of Beirut's campus and the subjects were second year medical students (year 2014-2015). All prospective participants were informed about the study in detail and those who were willing to participate signed an informed consent form prior to the start of the study (Appendix 1).

2.3 Randomization

Sixty-four consenting second year medical students, of the academic year 2014-2015, were randomly divided into two groups of 32 students using a double-blinded computer based randomization tool.

2.4 Sample Size

Initially a sample size of 70 participants was proposed for this pilot study with a 20% anticipated dropout rate. Sixty-four students agreed to participate and signed the informed consent; however, only 38 participants completed the whole study. Group 1 had a final number of 18 participants and Group 2 had 20 participants. The final number recruited was lower than initial sample size due to loss of follow up during the duration of the study. 26 students, 14 from Group 1, and 12 from Group 2, were dropped from the study after the first phase, due to not attending the lecture or the practice/assessment sessions. Since it is a pilot study, a sample size of 38 students in total was deemed sufficient without affecting the statistical significance of the study. Hence, the study was completed despite lower final sample size. The study was not extended for another year to achieve the initially proposed sample size due to implementation of a new curriculum at the medical school, which exposes medical students to technical skills from the first year of medical school. This would have created a discrepancy within the student population and biased the results.

2.5 Intravenous line insertion activity

Students in Group 1 were given a 30-minute didactic lecture on intravenous line insertion, by an experienced co-investigator, followed by a short video showing the technique (Appendix 2). All learning material was also made available for Group 1 participants on Moodle (official learning management system at the American University of Beirut), for future reference. After the lecture, these students were taken to AUB's Hariri School of Nursing simulation lab, where, they had one attempt each to practice IV line insertion on a dummy guided by the tutor. At this stage, they were not assessed.

On the other hand, Group 2 was given a self-based learning task for IV line insertion and was provided with learning objectives a week prior to the practice session (Appendix 3). The same video shown to Group 1 was posted on Moodle for the Group 2 to watch. A week later, these students were called for a trial attempt of IV line insertion, on the same dummy as Group 1 but without the guidance of a tutor.

One week after the practice sessions both groups were called in for an assessment of IV line insertion skill, using the same dummy they practiced on earlier. Both groups came at the same time and they were pooled together to be randomly assigned to an assessment station. They were asked to conceal their group number from the evaluators. All stations assessing the participants had well-trained personnel, who were previously briefed on how to evaluate the participants for non-biased assessments. The evaluators were also blinded to the group each student belonged to, to avoid bias in evaluation.

The students were evaluated according to an evaluation form (Appendix 4) adapted from other studies (11). It included criteria such as proper preparation, number of attempts, the time taken to achieve the task and correct execution. For data analysis purposes, at the end of each assessment the students were given their evaluation form to write only their group number and return it to the study coordinator at the end of the room in an unmarked envelope.

2.6 Simple interrupted suture activity

The second activity of simple interrupted suture skill was done a month after the first activity. The groups were crossed over where, the Group 2 participants were now given a 30 minute didactic lecture, by a well-experienced principal investigator, on performing a simple interrupted suture followed by a short video showing the suturing technique (Appendix 5). The video was posted on Moodle for future reference. After the lecture, the students were assigned to 6 identical stations where they had one attempt to perform a simple interrupted stitch on a suturing pad model. This attempt was guided but not evaluated.

Group 1 was given a self-based learning task for a simple interrupted suture. A week prior to the practice session, the students were given the skill's objectives (Appendix 6) and the same video screened to group 2 was posted on Moodle for reference. Group 1 also had a trial attempt to perform a simple stitch on a suturing pad. This trial was not guided by an instructor nor evaluated.

One week after the practice session, both groups performed a simple suture on the same suturing pad used for practice. This time, students were assessed according to an evaluation form (Appendix 7) and the evaluators were again blinded to the students' group number.

2.7 Satisfaction Questionnaire

At the end of each assessment session, student satisfaction was assessed using an anonymous questionnaire (Appendix 8). The questionnaires were filled on the spot by the students, along with group number and activity name, and deposited in a wooden box at the end of the assessment room.

2.8 Data collection and analysis

The data was entered to the PASW (SPSS version 18.0). A p-value <0.05 was considered statistically significant. Statistical analysis was done using χ^2 test (chi-square test) to compare parameters.

3. Results

3.1 Intravenous line insertion skill assessment comparison

Both the didactic and self-based learning groups were assessed for IV line insertion technique, the results are shown in Table 1.

Hand washing prior to starting an IV line significantly differed between the two groups (p-value 0.003), where, 83% of the self-based learning (SBL) group complied as compared to only 35% of the students in the didactic learning (DL) group. Ninety-five percent (95%) of the DL group inserted IV line at the proper, previously taught, site; this differed significantly from the SBL group (p-value 0.04), where, only 66.7% of the students inserted IV accurately.

However, the two groups did not have any significant difference amongst them for any of the other assessment criteria. The overall scores were also not significantly different and the SBL group had a median overall score of 9, whereas DL group had a score of 8, depicting no difference in the performance between the two groups.

Table 1: Intravenous line insertion skill assessment comparison

	Variables		Self-based Learning Group	Didactic Learning Group	P value
Assessment	Total Sample		N=18	N=20	
	Washes hands	No Yes	3 (16.7%) 15 (83.3%)	13 (65.0%) 7 (35.0%)	0.003
	Applies tourniquet properly	No Yes	3 (16.7%) 15 (83.3%)	4 (20.0%) 16 (80.0%)	1.00
	Cleanses area of insertion properly	No Yes	2 (11.1%) 16 (88.9%)	1 (5.0%) 19 (95.0%)	0.60
	Inserts needle correctly	No Yes	4 (22.2%) 14 (77.8%)	4 (20.0%) 16 (80.0%)	1.00
	Insert IV at proper site (previously learned)	No Yes	6 (33.3%) 12 (66.7%)	1 (5.0%) 19 (95.0%)	0.04
	Dresses and tapes properly	No Yes	4 (22.2%) 14 (77.8%)	9 (45.0%) 11 (55.0%)	0.14
	Number of attempts	≥6 2-3 1	1 (5.6%) 1 (5.6%) 16 (88.9%)	3 (15.0%) 3 (15.0%) 14 (70.0%)	0.36
	Time needed to finish the task	5 min 4 min 3 min 2 min	2 (11.1%) 7 (38.9%) 7 (38.9%) 2 (11.1%)	8 (40.0%) 7 (35.0%) 3 (15.0%) 2 (10.0%)	0.16
	Assessment score (Total score = 12)	Median	9.0	8.0	0.07

3.2 Intravenous line insertion student satisfaction comparison

The results of the IV line insertion activity are shown in Table 2. For the IV line insertion activity, satisfaction was significantly higher amongst the SBL group (p-value 0.01) with a median satisfaction score of 22.50 as compared to the DL group with a score of 20.50.

There was 100% confidence amongst the SBL group that through the activity they were acquiring the skills needed to become a good health professional, a rate 20% significantly higher (p-value 0.008) than the confidence level observed in the DL group. In addition, 85% of the DL group agreed that such activities should become a regular part of the medical school curriculum, whereas, the agreement was significantly higher (p-value 0.001) in the SBL group at 100% agreement rate.

Table 2: Intravenous line insertion skill student satisfaction survey comparison

	Variables		Self-based Learning Group	Didactic Learning Group	P value
Satisfaction	Total Sample		N=18	N=20	
	The activity was worth doing	Totally disagree Disagree Agree Totally agree	0 (0.0%) 0 (0.0%) 9 (50.0%) 9 (50.0%)	0 (0.0%) 0 (0.0%) 10 (50.0%) 10 (50.0%)	1.00
	The activity had no added value to the learning experience	Totally disagree Disagree Agree Totally agree	11 (61.1%) 4 (22.2%) 3 (16.7%) 0 (0.0%)	7 (35.050) 9 (45.0%) 2 (10.0%) 2 (10.0%)	0.18
	I am confident to use what I learned during this activity	Totally disagree Disagree Agree Totally agree	0 (0.0%) 5 (27.8%) 7 (38.9%) 6 (33.3%)	0 (0.0%) 9 (45.0%) 10 (50.0%) 1 (5.0%)	0.08
	The experience was realistic	Totally disagree Disagree Agree Totally agree	0 (0.0%) 4 (22.2%) 9 (50.0%) 5 (27.8%)	0 (0.0%) 2 (10.0%) 17 (85.0%) 1 (5.0%)	0.06
	The activity was effective in helping me acquire new skills	Totally disagree Disagree Agree Totally	0 (0.0%) 1 (5.6%) 6 (33.3%) 11 (61.1%)	0 (0.0%) 3 (15.0%) 10 (50.0%) 7 (35.0%)	0.25

		agree			
I am confident that I am acquiring the skills needed to become a good health professional	Totally disagree	0 (0.0%)	0 (0.0%)	0.008	
	Disagree	0 (0.0%)	4 (20.0%)		
	Agree	5 (27.8%)	11 (55.0%)		
	Totally agree	13 (72.2%)	5 (25.0%)		
This type of activity should become a regular part of medical school curriculum	Totally disagree	0 (0.0%)	0 (0.0%)	0.001	
	Disagree	0 (0.0%)	3 (15.0%)		
	Agree	1 (5.6%)	10 (50.0%)		
	Totally agree	17 (94.4%)	7 (35.0%)		
Satisfaction score	Median	22.50	20.50	0.01	

3.3 Simple interrupted suture skill assessment comparison

For the simple interrupted suture skill, none of the assessment criteria were significantly different between the two groups and both, the SBL and DL groups, had a median assessment score of 9 (Table 3). Sixty percent of the SBL group tied the surgical knot correctly versus only 38.9 % in the DL group; however, the results were not found to be significantly different (p-value 0.19).

Table 3: Simple interrupted suture skill assessment comparison

	Variables		Self-based Learning Group	Didactic Learning Group	P value
Assessment	Total Sample		N=20	N=18	
	Needle loaded properly	No	9 (45.0%)	9 (50.0%)	0.76
		Yes	11 (55.0%)	9 (50.0%)	
	Number of attempts	≥6	0 (0.0%)	2 (11.1%)	0.13
		4-5	3 (15.0%)	0 (0.0%)	
		2-3	6 (30.0%)	8 (44.4%)	
1		11 (55.0%)	8 (44.4%)		
Needle traveled perpendicular to edge	No	2 (10.0%)	3 (16.7%)	0.65	
	Yes	18 (90.0%)	15 (83.3%)		
Mattress damage	Significant	1 (5.0%)	1 (5.6%)	0.99	
	Minimal	7 (35.0%)	6 (33.3%)		
	None	12 (60.0%)	11 (61.1%)		

	Enter/Exit same distance from both edges	Not Within 2mm	4 (20.0%) 16 (80.0%)	5 (27.8%) 13 (72.2%)	0.57
	Time needed to finish the task	5 min	0 (0.0%)	1 (5.6%)	0.27
		4 min	3 (15.0%)	1 (5.6%)	
		3 min	7 (35.0%)	3 (16.7%)	
	within 2 min	10 (50.0%)	13 (72.2%)		
	Tied knot correctly	No	8 (40.0%)	11 (61.1%)	0.19
		Yes	12 (60.0%)	7 (38.9%)	
	Assessment score (Total score= 12)	Median	9.0	9.0	0.73

3.4 Simple interrupted suture skill student satisfaction comparison

SBL group had a significantly higher (p-value<0.0001) satisfaction median score of 23.50, as compared to the DL group, which scored 18.50 (Table 4). Eighty-five percent of the students in the SBL group were confident about using the simple interrupted suture skill in future, a rate significantly higher (p-value=0.005) than the DL group, where, only 37.5% of the participants were confident. In the SBL group, 80% of the SBL group participants disagreed that the activity had no added value to the learning experience and 100% of them believed that the activity helped them acquire a new skill; these percentages were significantly higher than the DL group.

Table 4: Simple interrupted suture skill student satisfaction survey comparison

	Variables		Self-based Learning Group	Didactic Learning Group	P value
Satisfaction	Total Sample		N=20	N=18	
	The activity was worth doing	Totally disagree	0 (0.0%)	1 (7.1%)	<0.0001
		Disagree	0 (0.0%)	3 (21.4%)	
		Agree	4 (20.0%)	9 (64.3%)	
Totally agree		16 (80.0%)	1 (7.1%)		
The activity had no added value to the learning experience	Totally disagree	9 (45.0%)	2 (14.3%)	0.04	
	Disagree	7 (35.0%)	8 (57.1%)		
	Agree	1 (5.0%)	4 (28.6%)		
	Totally agree	3 (15.0%)	0 (0.0%)		

		agree			
	I am confident to use what I learned during this activity	Totally disagree Disagree Agree Totally agree	0 (0.0%) 3 (15.0%) 12 (60.0%) 5 (25.0%)	6 (37.5%) 4 (25.0%) 6 (37.5%) 0 (0.0%)	0.005
	The experience was realistic	Totally disagree Disagree Agree Totally agree	0 (0.0%) 4 (20.0%) 7 (35.0%) 9 (45.0%)	1 (6.3%) 4 (25.0%) 10 (62.5%) 1 (6.3%)	0.06
	The activity was effective in helping me acquire new skills	Totally disagree Disagree Agree Totally agree	0 (0.0%) 0 (0.0%) 8 (40.0%) 12 (60.0%)	2 (13.3%) 3 (20.0%) 7 (46.7%) 3 (20.0%)	0.02
	I am confident that I am acquiring the skills needed to become a good health professional	Totally disagree Disagree Agree Totally agree	1 (5.0%) 0 (0.0%) 8 (40.0%) 11 (55.0%)	3 (18.8%) 3 (18.8%) 5 (31.3%) 5 (31.3%)	0.09
	This type of activity should become a regular part of medical school curriculum	Totally disagree Disagree Agree Totally agree	0 (0.0%) 0 (0.0%) 6 (30.0%) 14 (70.0%)	2 (12.5%) 3 (18.8%) 5 (31.3%) 6 (37.5%)	0.05
	Satisfaction score	Median	23.50	18.50	<0.0001

4. Discussion and Conclusion

In this study, self-based learning was compared to didactic learning in teaching medical students medical or surgical skills. In the IV line insertion skill, the SBL group performed better in washing hands prior to the procedure, whereas a higher percent of the DL group inserted the IV line at the correct place. However,

none of the other scores were significantly different between the groups in the IV line assessment skill activity. In the simple interrupted suture skill activity, the assessment scores of the two groups did not differ significantly. Therefore, the results showed that there was no major significant difference between the two groups in terms of their performance assessment for both the skills. However, student satisfaction significantly differed between the two groups with the SBL group expressing higher overall satisfaction in both activities.

From the results obtained, it can be deduced that in terms of performance in technical skills both modes of learning, self-based and didactic, are equivalent. These results are similar to those obtained by Hayashi et al. for non-technical skills, where both the tutorless and tutored PBL group had similar written examination results (8). It can be said that the mode of information delivery (technical or non-technical), self-based or didactic, does not affect the performance and both yield similar results.

In terms of student satisfaction, the results obtained are similar to Brydges et al. and Hashmi where the students scored higher after team-based-learning (TBL) than after traditional didactic lecture (TDL) and considered TBL to be a superior mode of learning (7, 12). Both of the self-based learning groups scored higher on satisfaction and seemed more confident of their ability to use the techniques in future.

Thomas et al. compared multiple standardized exams' results of Obstetrics and Gynecology residents who received traditional didactic medical education and those who had a PBL curriculum, and found no significant difference between their performances (13). Whereas, Hoffman et al. suggested a role of problem based learning (PBL) in better knowledge, skills and future practice of medical graduates, in a 10 year study at the University of Missouri-Columbia School of Medicine, which, showed benefits of PBL technique in terms of better performance on United States Medical Licensing Examinations (USMLEs) and improved evaluations by residency program directors (14). Keeping the above in mind, it can be recommended that in future medical school curriculum should move more towards self-based learning as it yields the same results, if not better, as didactic lectures, in addition to better student satisfaction and confidence. Shifting the mentoring process of learning, from an apprenticeship model requiring intensive faculty involvement, to a simpler self-based learning method will require fewer resources especially with the increasing number of medical students and decreasing hours of training. Results from this study could be applied to medical students as well as residents as they are still in the learning phase and are required to learn techniques to advance in their residency programs.

However, despite the promising results one shortcoming of this study was the limited number of participants. If done on a larger scale, more insight can be obtained and effective change in the medical school curriculum can more confidently be brought about.

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7. Declaration of Interest

The authors report no declarations of interest. This research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Appendix

Appendix 1

Consent to participate in a research study

Investigator: Dr. Joseph Nassif.

Research: Self-Based Learning Compared to Didactic Learning for Basic Medical or Surgical Technical Skills.

Site: American University of Beirut Medical Center

Dear participant

You are being asked to participate in a training research study conducted at the American University of Beirut where the principal investigator (Dr. Nassif) or the research assistant (Dr. Abbasi) will directly approach you for your participation in the study. Please take time to read the following information carefully before you decide whether you want to take part in this study or not. Feel free to ask your doctor, teachers and the investigators if you need more information or clarification about what is stated in this form and the study as a whole.

1) This study involves research about teaching suturing and IV line insertion. The objective of this study is to compare the self-based learning to the didactic teaching of these skills. The purpose of this study is to gather information about the two modalities of teaching from medical (MED II) students. The duration of the study is one academic year. However, if you, as a medical student, agree to participate, you will be involved only for the one week of the academic year. You will be required to attend between a maximum of four teaching activities lasting a maximum of 30 and 60 minutes each. This study aims at recruiting 70 medical students. The teaching activities will consist of a lecture and a skills training session. The activities will be held on two different days one week apart. You will be assigned randomly to a self-based teaching then to a didactic teaching group for each skill. For you, there will be no financial reward or expenses for participating in this study. . As a general scheme, the didactic group will have a lecture given by an attending during which a video and a guided teaching of the skill will be done. After one week, an anonymous evaluation will be run. The self-based group will have objectives to prepare about the skills and a video to watch. A training on the skill is offered one week before the anonymous evaluation. There is an equal probability for every student (50% chance) to participate in either the didactic teaching or the self-based learning for every skill. The investigators may end a student's participation if he is not presenting to the different sessions. Significant new findings will be conveyed to participating students.

- 2) The risks you will be subjected to are minimal; they include not getting a chance to learn the IV line insertion or the suturing technique by either method. There may be additional unforeseeable and unpredictable risks.
- 3) Your participation in this study and the results of the assessments will not affect your grades under any circumstances. The individual grades will not be released to the medical school nor will they be used for any form of medical school evaluations.
- 4) During the hands-on assessment, there is a possibility your station might be videotaped and/or audio taped to be used for teaching purposes and/or evaluation of the study, if you consent.
- 5) The benefits you will get from participating in this study will include the chance of Learning an IV line insertion and a simple suture technique.
- 6) Alternative teaching or training methods may be advantageous to the students but are not available in AUBMC or in this study; they include training on real patients.
- 7) If you agree to participate in this research study, the information will be kept confidential. Your participation will be anonymous, and for the sake of follow up throughout the study you will be asked to create a unique identification code (only known to you). Unless required by law, only the study doctor and designee, the ethics committee and inspectors from governmental agencies will have direct access to the records of this study at the American University of Beirut Faculty of Medicine. Records will be monitored and may be audited without violating confidentiality.
- 8) In case of any adverse event as a result of the study, there will be no compensation to cover such expenses in case it is not covered by a third party or governmental insurance.
- 9) The research data and audio/video tapes will be used solely for the purpose of the study. Hard copies of the consent forms, questionnaires and electronic data will be kept in safe files in locked cabinets/ in a password protected computer at the principle investigator's personal office, with access available only to the designated investigators. After the study, all data will be kept, in safe files in locked cabinets/computer at the principle investigator's personal (PI) office, for a maximum of 5 years post completion of the study. Only PI will have access to this data and after 5 years they will be disposed off through shredding by PI. Except for the audio/video tapes which were consented to be kept for future teaching and research purposes (mentioned above), will be stored safely at the P.I's personal office with him having the sole access to them.

Investigator's Statement:

I have reviewed, in detail, the informed consent document for this research study with the student the purpose of the study and its risks and benefits. I have answered to all the medical student's questions clearly. I will inform the participant in case of any changes to the research study.

Name of Investigator or designee Signature:

Date & Time:

Signature:

Subject's Participation:

I have had time to read and consider participation in this study. I have read and understood all aspects of the research study and all my questions have been answered. I consent to participate in this research study; I voluntarily agree to be a part of this research study and I know that I can contact Dr. Joseph NASSIF at 01-350000 ext. 5636 or jn25@aub.edu.lb or any of her designee involved in the study in case of any questions or injury due to research. If I feel that my questions have not been answered or if I have any questions about my rights as a subject in this research, I can contact the Institutional Review Board for human rights at irb@aub.edu.lb or 01-350000 ext. 5445. I understand that my participation is voluntary, that refusal to participate will involve no loss of benefit, and that I am free to withdraw this consent and discontinue participation in this project at any time, even after signing this form, and it will not affect my education, grades or benefits. I am aware that consenting to participate in this study will require me to fill out a satisfaction questionnaire at end of each skill's assessment. I hereby consent to participate in the satisfaction survey at the end of each skill's assessment. I understand that my participation may be ended by the investigators and that significant new findings will be conveyed to me. I know that I will receive a copy of this signed informed consent.

“I hereby consent / decline (choose one) to be audio/video taped during each skill's assessment”.

(If you consent to be audio/video taped during each skill's assessment, please indicate below whether the audio/video tapes can be used for both future teaching and research purposes or either use by faculty and/or students.

i) “I consent / decline (circle one choice) the use of the audio/video tapes for the purpose of future teaching by faculty and/or students”.

ii) “ I consent / decline (circle one choice) the use of the audio/video tapes for research purposes by faculty and/or students”.

Name of Student:

Date & Time:

Signature:

Appendix 2

Outline lecture for IV line insertion technique

- 1 – Introduction & vascular anatomy of the arm, forearm and hand
- 2 – Indication of peripheral IV line insertion
- 3 – Technique of IV line insertion
- 4 – Complications of IV line insertion and their management

Appendix 3

Objectives for self-based IV line insertion learning

- Know the anatomy of the anatomy of the arm, forearm and hand
- Define the indications of peripheral IV line insertion
- Describe the technique of IV line insertion
- Identify the complications of IV line insertion and know their management

Appendix 4

Assessment form for IV line insertion technique

Criterion Assessed					Score: .../12
1-Washes hands	Yes	No			.../1
2- Applies tourniquet properly	Yes	No			.../1
3-Cleanses area of insertion properly	Yes	No			.../1
4- Inserts needle correctly	Yes	No			.../1
5- Insert IV at proper site (Previously learned)	Yes	No			.../1
6- Dresses and tapes properly	Yes	No			.../1
7- Number of attempts (1=3, 2-3=2,4-5=1,6 or more=0)	1	2-3	4-5	6 or more	.../3
8- Time to finish task (2min=3, 3min=2,4min=1,5min=0)	2 min	3min	4min	5min	.../3

Appendix 5

Outline lecture for simple interrupted suture technique

- 1 – Introduction
- 2 – Instruments and threads
- 3 – Indications of suturing
- 4 - Technique of simple suture

Appendix 6

Objectives for self-based simple interrupted suture technique

- Define a simple stitch suture technique
- Know the instruments and threads needed to perform the simple stitching
- Know the indications of suturing
- Describe the technique of simple suture

Appendix 7

Assessment form suture

Criterion assessed					Score: .../12
1. Needle loaded properly: (yes=1, no=0)	yes	no			.../1
2. Number of attempts: (1=3, 2-3=2,4-5=1,6 or more=0)	1	2-3	4-5	6 or more	.../3
3. Needle traveled perpendicular to edge. (yes=1, no=0)	yes	no			.../1
4. Mattress damage (none=2, minimal=1,significant=0)	none	Minimal	significant		.../2
5. Enter/exit same distance from both edges (within 2mm=1, not=0)	Within 2mm	not			.../1
6.Time needed to finish the task (within 2min=3, 3min=2,4min=1,5min=0)	Within 2min	3min	4min	5min	.../3
7. Tied knot correctly (yes=1, no=0)	Yes	No			.../1

Appendix 8**Student satisfaction questionnaire form****Activity name:** _____**Group number:** _____

Please rate the following statements based on how much you agree on	1	2	3	4
the following 4-point Likert scale	Totally Disagree	Disagree	Agree	Totally Agree
1) The activity was worth doing	1	2	3	4
2) The activity had no added value to the learning experience	1	2	3	4
3) I am confident to use what I learned during this activity	1	2	3	4
4) The experience was realistic	1	2	3	4
5) The activity was effective in helping me acquire new skills	1	2	3	4
6) I am confident that I am acquiring the skills needed to become a good health professional	1	2	3	4
7) This type of activity should become a regular part of medical school curriculum	1	2	3	4

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