

## Different Modalities For Acquisition Of Better Suturing Skills- A Comparative Study

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**Abstract:** A very common occurrence in medical colleges nowadays is finding junior resident struggling to perform even a basic surgical procedure. Workshop based learning or Simulation-based learning in surgery is a learning model where an environment similar to real life surgical situation is created for the trainee to learn various surgical skills. In this study my objectives were to compare the effectiveness of video assisted and simulator based learning in teaching suturing skills to the students, to compare the knowledge regarding the sutures and suturing methods and to assess student's perception towards these methods. Study design was experimental study and on considering the results students who were exposed to video based learning scored better in the post-test MCQ's when compared to the other. On accessing the suturing skills by modified Global rating scale for suturing not much significant difference was seen between two groups. On considering certain factors in Global rating scale, students who attended VBL scored better in appropriate aseptic technique and disposal of equipment. Correct use of instruments and correct suture pattern and technique was better demonstrated by students who attended WBL. So I wish to conduct a mixed type of WBL and VBL in teaching suturing to my students.

**KEYWORDS:** Workshop based learning, Video based learning, Suture training.

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### I. Introduction:

A very common occurrence in medical colleges nowadays is finding junior resident struggling to perform even a basic surgical procedure. Simulation-based learning in surgery is a learning model where an environment similar to real life surgical situation is created for the trainee to learn various surgical skills. It can be used to train a new operator as well to assess his skills. This methodology helps in repetitive practice of surgical skills on nonliving things so that the operator can be near-perfect when operating on a live patient. The significant amount of physical resources and physician time to train the students is overcome by video based learning. These methods help the young doctors to know their surgical skills and select their postgraduate degree. For acquisition of suturing skills, not only the psychomotor domain that is important, but also cognitive and affective domains are equally important.

Medical students are generally taught how to suture before beginning the clinical portion of their education. However, the timing and process through which they are taught vary greatly across institutions, and the time from instruction to suturing in the clinic may be many months, with questionable skill retention. Teaching methods include large group instruction during preclinical training, small group instruction before specific clinical rotations, and individual instruction from physicians of various specialties. While the basic mechanics of placing a simple suture are universal, techniques vary widely among different instructors.

Most publications regarding evaluation of suturing technique come from the surgical literature and are based on data obtained from surgical residents.<sup>1-4</sup> The objective structured assessment of technical skills (OSATS) is a validated checklist used for evaluation of competence in procedural skills that can be adapted for specific tasks, including wound closure. The OSATS has been used successfully to evaluate medical students performing laceration repair in a simulated environment.<sup>5</sup>

Supplemental video instruction of surgical technique has been demonstrated as superior to classroom instruction alone for procedural skills in surgery and dentistry.<sup>6-8</sup>

### II. Objectives:

- 1.To compare the effectiveness of video assisted and simulator based learning in teaching suturing skills to the students.
2. To compare the knowledge regarding the sutures and suturing methods.
- 3.To assess student's perception towards these methods.

**STUDY DESIGN:**

Experimental study

**Study setting:** Travancore medical college Hospital kollam

**Study populations :**

2014 Batch students of Travancore Medical College.

**Sample size :** 100

**Study period :** November 2017-December 2017.

**STATISTICAL ANALYSIS:**

The collected data will be entered in Microsoft Excel work sheet, and analyses using SPSS version 16 software. Demographic data will be analysed by using frequencies, Mean, Median and Standard deviation. Tests of significance will be analysed by using Independent sample t test, to compare the difference between two groups.

**Ethical issues:** Nil

**III. Materials And Methods:**

**INCLUSION CRITERIA:**

Regular 2014 batch students (pre final) of Travancore Medical College, Kollam who had given consent for study.

**EXCLUSION CRITERIA:**

Those who have attended any surgical skills training before and who are absent for the class and training. Randomization was performed by assigning students a number, between 1 and 100, based on their order of enrolment. Students were then separated into two groups defined by odd and even assigned numbers. Students with even numbers (Group A) were assigned to the VBL (Video based learning) group, while students with odd numbers (Group B) were assigned to the WBL (workshop based learning). All the students were provided with the pre-test MCQs to assess the cognitive domain.

Group A was shown video clippings of the suturing materials, cleaning and draping the surgical sites, proper disposal of waste materials and suturing techniques. Then they were asked to practice suturing over the sponges provided to them in groups of three. Group B had lecture class on suture materials and sterile precautions to be followed during the surgical procedure and then they were divided into four groups of eleven and shown the different suturing techniques over sponge and they were asked to practice it themselves in group of three over the sponges. We were able to finish the VBL in three hours but WBL took almost four hours. Classes for both the groups are taken by a consultant surgeon from outside who is expert in surgical skill training.

Students of both the groups are given one week time for practicing the suturing skills followed by an assessment with the help of an OSPE evaluated by peer reviewed modified Global Rating Score.

The students are asked to continue their suturing practice over sponges and they were again assessed with the help of an OSPE after one month.

Post-test evaluation will also be made with the same MCQs and it will be evaluated separately for both the group. At the end of evaluation cross over is made in the group and a questionnaire was given to the students to know which teaching method is more acceptable to them.

**IV. Results:**

Out of 100 students in the batch 11 students have been excluded from the study as they have attended suturing class before and one student was absent for the class.

Pre test MCQ's was conducted before the students do their suturing training on workshop based learning and video based learning. Post test was conducted after one month and was evaluated separately for both the groups. Results are as shown in table 1, 2, 3 and 4.

Table 1 show that students who were exposed to video based learning scored better in the post-test MCQ's when compared to the other. Table 2 and 3 indicates that students have scored better in post test. Table 4 shows that the students who have attended VBL scored better when compared to those who have attended WBL.

**Table: 1** Comparing post test scores in video based learning and workshop based learning

Post test scores	Learning Methods		Total
	Video based learning	Workshop based learning	
<10	0(0.0%)	13(100.0%)	13(100%)
11	7(38.9%)	11(61.1%)	18(100%)
12	9(42.9%)	12(57.1%)	21(100%)
13	17(73.9%)	6(26.1%)	23(100%)
14	8(80.0%)	2(20.0%)	10(100%)
15	3(100.0%)	0(0.0%)	3(100%)
Total	44(50.0%)	44(50.0%)	88(100%)

**Table: 2.** Association between video based learning in pre test and post test.

	Group	N	Mean	SD	t value	p value
Video based learning	Pre test	44	7.50	2.37	20.926	0.001*
	Post test	44	12.80	1.13		

\*p value calculated by dependent samples t test, p <0.05 considered as significant

**Table: 3.** Association between workshop based learning in pre test and post test.

	Group	N	Mean	SD	t value	p value
Workshop based learning	Pre test	44	7.25	2.46	15.628	0.001*
	Post test	44	11.34	1.25		

\*p value calculated by dependent samples t test, p <0.05 considered as significant

**Figure: 1** Comparing post test scores in video based learning and workshop based learning

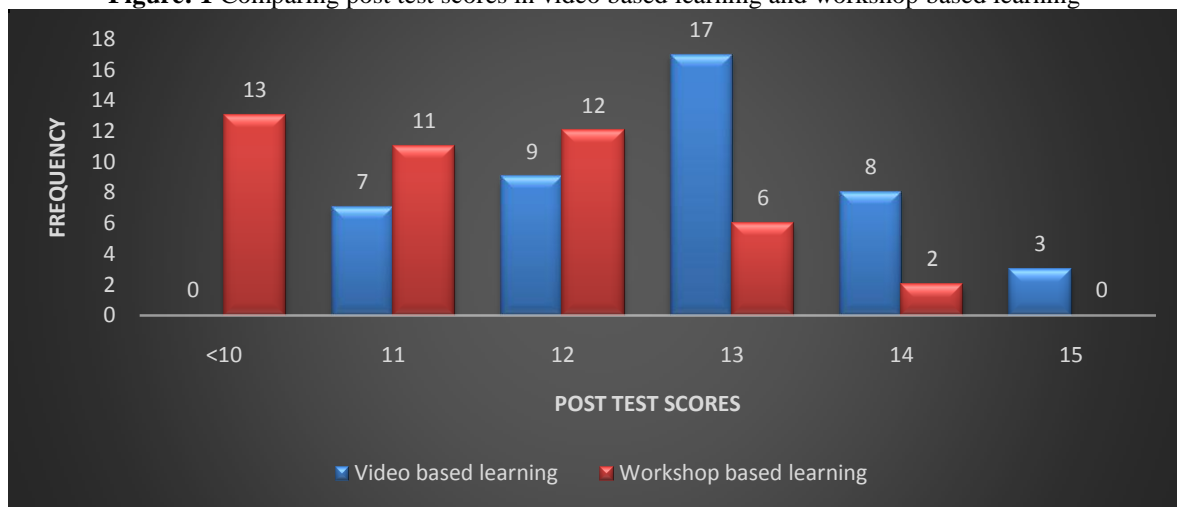


Figure 1 shows students who attended VBL scored better in post test .

**Table: 4** Association between post test in video based learning and workshop based learning.

	Learning Methods	N	Mean	SD	t value	p value
Post test	Video based learning	44	12.80	1.13	5.70	0.001*
	Workshop based learning	44	11.34	1.25		

\*p value calculated by independent samples t test, p <0.05 considered as significant

The students were assessed randomly after 1 week and were assessed with help of modified Global rating scale for suturing.

Table 5 & 6 and figure 2 shows not much significant difference between two groups. On considering certain factors in Global rating scale students who attended VBL scored better in appropriate aseptic technique and disposal of equipment.

Correct use of instruments and correct suture pattern and technique was better demonstrated by students who attended WBL.

**Table: 5** Mean score difference of Assessment after 1 week in video based learning and workshop based learning.

Modified global rating scale for suturing	Video based learning	Workshop based learning
Safety	1.50	1.70
Organisation and selection of materials	2.43	2.27
Appropriate aseptic technique	3.11	1.59
Correct use of instruments	1.52	2.82
Correct suture pattern and technique	1.84	2.91
Appropriate disposal of equipment	3.02	1.48
Assessment after 1 week	13.43	12.77

**Table: 6** Comparison between assessment after 1 week in video based learning and workshop based learning.

	Learning Methods	N	Mean	SD	t value	p value
Assessment after 1 week	Video based learning	44	13.43	1.89	1.654	0.102*
	Workshop based learning	44	12.77	1.84		

\*p value calculated by independent samples t test, p <0.05 considered as significant

**Figure: 2** Mean score difference of Assessment after 1 week in video based learning and workshop based learning.

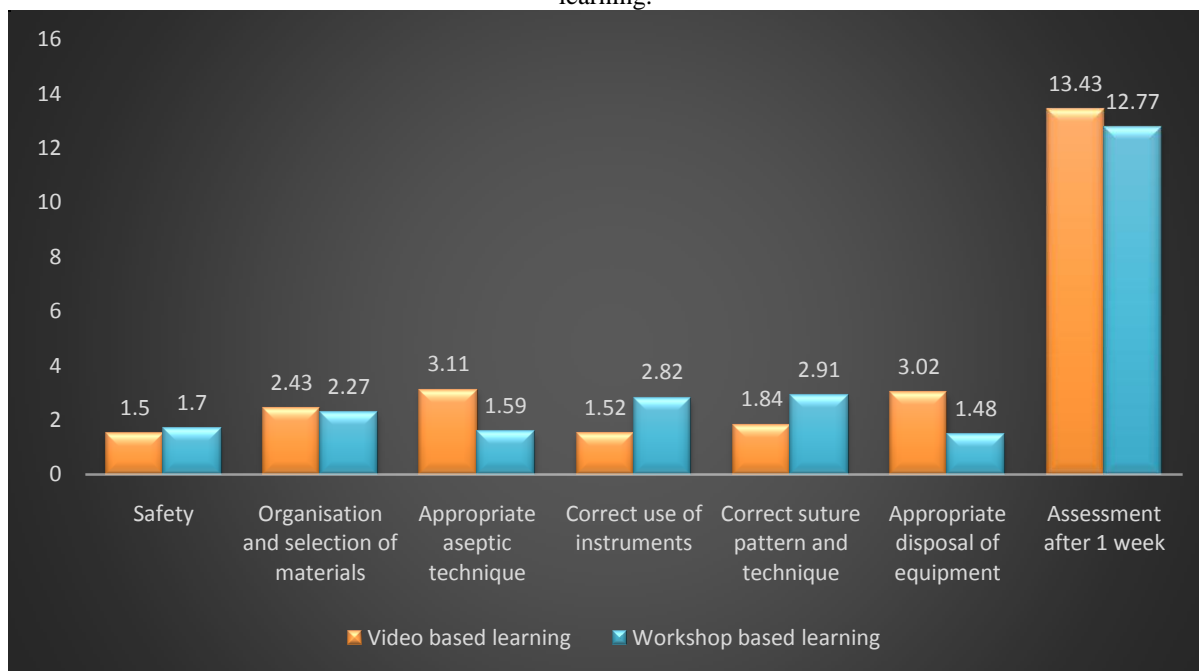


Table 7 &8 and figure 3 shows the mean score difference between the students who attended VBL and WBL after one month. On assessing the students after one month of first assessment randomly, most of them improved irrespective of what training they attended. But there was not much difference in the results between the students who attended WBL and VBL.

Similar to the first assessment students who attended VBL scored better in appropriate aseptic technique and disposal of equipment. Correct use of instruments and correct suture pattern and technique was better demonstrated by students who attended WBL.

**Table: 7** Mean score difference of Assessment after 1 month in video based learning and workshop based learning by Modified Global rating scale.

Modified global rating scale for suturing	Video based learning	Workshop based learning
Safety	2.07	2.41
Organisation and selection of materials	3.25	3.18
Appropriate aseptic technique	3.91	2.55
Correct use of instruments	2.18	3.73
Correct suture pattern and technique	2.57	4.09
Appropriate disposal of equipment	4.09	2.43
Assessment after 1 month	18.07	18.39

**Table: 8** Comparison between assessment after 1 month in video based learning and workshop based learning by Modified Global Rating scale.

	Learning Methods	N	Mean	SD	t value	p value
Assessment after 1 month	Video based learning	44	18.07	1.89	0.754	0.453*
	Workshop based learning	44	18.39	2.06		

\*p value calculated by independent samples t test, p <0.05 considered as significant

**Figure: 3** Mean score difference of Assessment after 1 month in video based learning and workshop based learning.

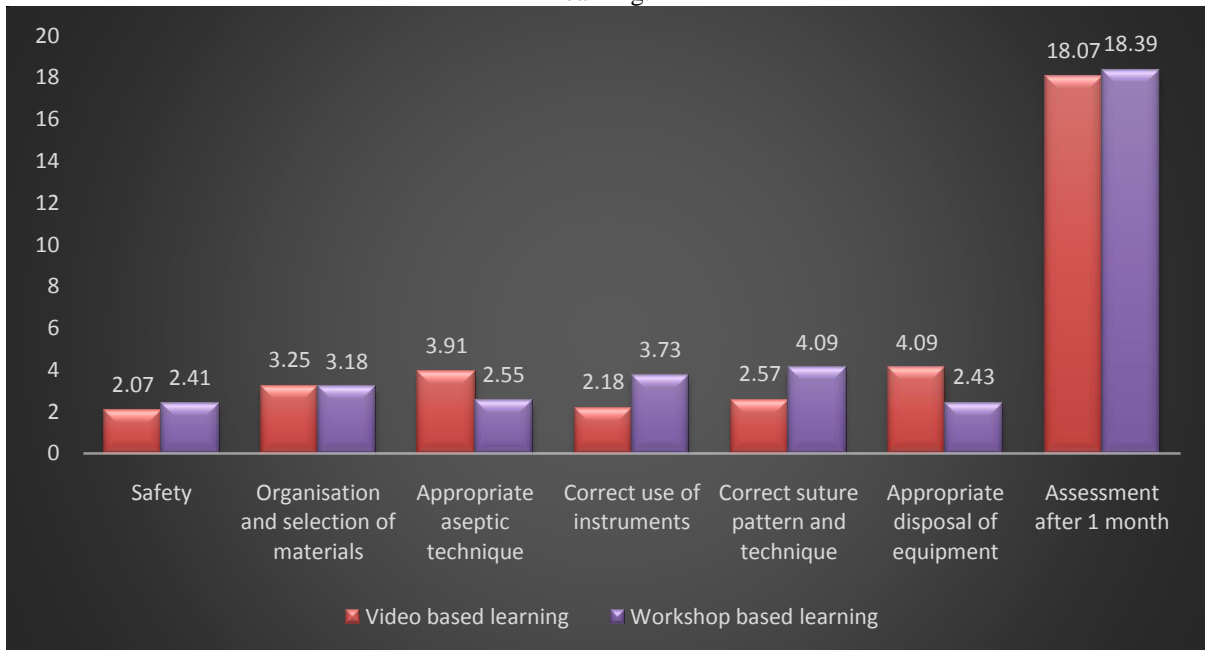


Table 9 and 10 shows that students improved significantly after one month in assessment irrespective of the training they attended.

**Table: 9.** Comparison between video based learning in assessment after 1 week and assessment after 1 month by Modified Global rating scale.

	Group	N	Mean	SD	t value	p value
Video based learning	Assessment after 1 week	44	13.43	1.89	15.193	0.001*
	Assessment after 1 month	44	18.07	1.89		

\*p value calculated by dependent samples t test, p <0.05 considered as significant

**Table: 10** Comparison between workshop based learning in assessment after 1 week and assessment after 1 month.

	Group	N	Mean	SD	t value	p value
Workshop based learning	Assessment after 1 week	44	12.77	1.84	17.788	0.001*
	Assessment after 1 month	44	18.39	2.06		

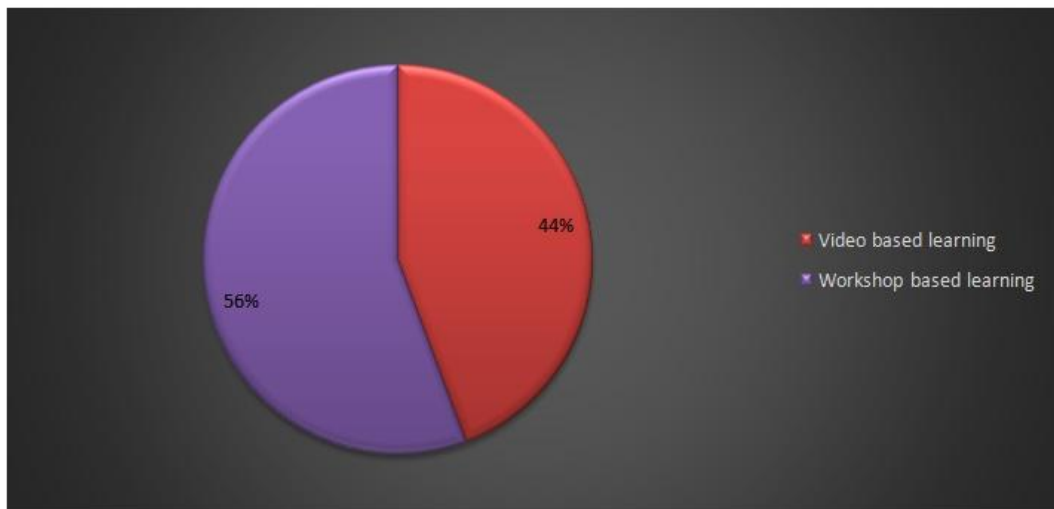
\*p value calculated by dependent samples t test, p <0.05 considered as significant

A mixed response was seen in students on asking their perception towards teaching methods, which is shown in table 11 and figure 4.

**Table: 11** Student's perception towards teaching methods.

Student's perception towards teaching methods	Frequency	Percentage
Video based learning	39	44.3
Workshop based learning	49	55.7
Total	88	100.0

**Figure: 4** Student's perception towards teaching methods.



### **V. Discussion:**

Medical students often use shadowing experiences, simulation labs, and live workshops to develop procedural skills such as laceration repair that will better prepare themselves for their clinical practice. Many of these experiences require a tremendous amount of training resources (physician time, space, practice materials, and live tissues) and planning to synchronize the availability of students and physicians. There are various types of simulation techniques. Newer methodologies to teach surgical skills and assess students objectively have been developing as well. These include virtual reality, robotics, telemedicine, computer games, artificial skin, and wound closure pads. Their success depends on how close they are to reality in terms of the texture and handling.

In our study, the time taken for training by video based learning was less when compared to workshop based learning. Students who participated in VBL had no significant difference in suturing scores on assessing by Modified global rating scale at one week and one month time compared to WBL. These results suggest that VBL may be as effective as workshop based training. The implementation of accessible VBL into medical students' pre-clinical education may be an effective way to teach students procedural skills while saving time, space, and resources used for scheduled instruction in an environment of ever-increasing educational demands.

While VBL serves as a promising educational tool, some limitations to this mode of learning include limited interaction with residents and physicians and lack of instructor feedback. In WBL there is better interaction between students and instructor and the feedback followed by corrections can be given at once. Limitations of this study is, to get proper feedback we have to evaluate these students when they perform in their clinical practice or during housesurgery.

### **VI. Review Of Literature**

On reviewing the literature with searches in Pub Med such as video, suturing, medical education, learning, medical students and found several relevant articles published in the last 10 years. Several studies have investigated integrating video modules into medical curriculum and overall, findings have been controversial. One study aimed to identify willingness to learn from video modules in virtual patient encounters. A total of 120 students took a post-encounter survey with majority preferring text-based learning over video. However, the video modules were perceived to be more thorough and with higher detail. In a second study, third-year medical students used VBLs for their pediatrics rotation and video modules were statistically associated with higher recognition of principal symptoms, appropriate diagnosis and consistency between observed symptoms and diagnosis

Study done by Nicholas Chien et al "Assessing the Impact of Video-based Training on Laceration Repair: A Comparison to the Traditional Workshop Method" resulted that , students who participated in VBL had no significant difference in suturing scores at one and three months compared to LWL. These results suggest that VBL may be as effective as live workshop training. The implementation of accessible VBL into medical students' pre-clinical education may be an effective way to teach students procedural skills while saving time, space, and resources used for scheduled instruction in an environment of ever-increasing educational demands.<sup>12</sup>

Niti Khunger and Sushruta Kathuria in their study" Mastering Surgical Skills Through Simulation-Based Learning: Practice Makes One Perfect "concluded that Simulation-based training helps medical students,

surgical residents in various specialties including dermatology, and additionally older practitioners to learn and master surgical techniques. Simulation enables the trainee to avoid the early error-prone and difficult part of the surgical training curve and in addition, to gain confidence before entering the surgical operating environment.<sup>13</sup>

## VII. Conclusion:

From the results which I had received I wish to conclude that Video based learning is better than lecture as the students were able to understand about the sutures and their uses better by VBL. But on assessing the students by modified global criteria for suturing I understood that both VBL and WBL plays a major role in learning suturing because certain factors in suturing are better understood by VBL and other by WBL. So I wish to conduct a mixed type of WBL and VBL in teaching suturing to my students.

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## General Surgery MCQ

- Q1)** Cutting needle is primarily used for suturing  
a) skin b) subcutaneous tissue c) muscle d) blood vessels
- Q2)** Which among the following is an absorbable suture material –  
a) Nylon b) Prolene c) silk d) Catgut
- Q3)** Which among the following is a non-absorbable suture –  
a) Catgut b) Monocryl c) silk d) Vicryl
- Q4)** Which among the following is commonly used for skin suturing –  
a) Dexon b) Catgut c) Nylon d) Vicryl
- Q5)** Facial suture should be placed \_\_\_\_\_ mm apart –  
a) 3 – 5 mm b) 5 – 8 mm c) 8 – 10 mm d) 10 – 12 mm
- Q6)** What type of suture material is Vicryl –  
a) absorbable, synthetic b) absorbable, natural  
c) nonabsorbable, synthetic d) nonabsorbable, natural
- Q7)** Which of the following tissues would be most suitable for a non-absorbable suture –  
a) Bowel b) stomach c) tendon d) bladder
- Q8)** What is a disadvantage of multifilament suture –  
a) difficult to handle b) poor knot security  
c) provoke a greater tissue reaction d) higher infectivity
- Q9)** Which of the following is a synthetic suture material –  
a) silk  
b) nylon  
c) catgut  
d) steel

**Q10)** Which of the following is the smallest suture material-

- a) 1 – 0      b) 3 – 0 c) 4 – 0 d) 7 – 0

**Q11)** Where should a needle be hold by needle holder –

- a) needle point                      c) needle body  
b) swaged end                        d) all of the above

**Q12)** Catgut is prepared from sub mucosal layer of intestine of-

- a) cat      b) sheep      c) rabbit      d) cow

**Q13)** How many steps there in universal method of hand washing –

- a) 4 b) 5 c) 6 d) 2

**Q14)** Which of the following is not a suture knot –


- a) reef knot                      b) linen knot                      c) granny knot d) surgeons knot

**Q15)** Which of the following is not a property of ideal suture material –

- a) adequate tensile strength                      c) should have more memory  
b) should be least reactive      d) good knot holding property

Modified global rating scale for suturing						
		Name: _____				
		Clearly below expectations		Acceptable performance		Performs above expectations
<b>Safety</b>	Removing prior dressing and biohazard disposal	1 Fails to respect safety	2	3 Occasionally tentative in approach	4	5 Always conscious of safety and demonstrates confidence
	Infiltration of local anesthesia					
	Proper handling of suture materials					
<b>Organisation and selection of materials</b>	Identifies the proper suture materials	1 Fails to select correct materials and / or instruments for task. Does not organize appropriately prior to starting task.	2	3 Slowly selects appropriate materials. Organizes them but not in a manner that necessarily helps improve efficiency with performing task or has some materials .	4	5 Quickly and confidently selects correct materials and instruments for task. organizes in a deliberate manner that facilitates task. materials
	Gather the required instruments					
<b>Appropriate aseptic technique</b>	Scrubbing the hands	1 Demonstrates deficient knowledge or execution of aseptic technique without recognizing and correcting it.	2	3 Competent performance that indicates working knowledge of aseptic technique but committed some minor errors that were recognized and corrected	4	5 Superior attention to aseptic technique. Demonstrates good understanding of sterile versus clean technique . no mistakes made
	Cleaning the area and establish sterile field.					
<b>Correct use of instruments uc</b>	Proper holding of instruments.	1 Student may use an instrument incorrectly and may or maynot correct mistake but is still able to get the job done	2	3 Student uses instrumentation correctly for most part. occasional errors are made but awareness and correction is demonstrated	4	5 Student holds and uses instruments correctly throughout using proficient and smooth technique. no errors in use or handling occur.
<b>Correct suture pattern and technique</b>	Proper handling of suture materials.	1 Student uses inappropriate pattern bite sizes or spacing.	2	3 Student uses appropriate pattern bite sizes and spacing for majority of the task but not all.	4	5 Student consistently places sutures using appropriate pattern , bite sizes and spacing in a proficient manner.
	Proper tying of Knots.					
	Approximation of wound edges.					
	Distance between sutures.					
<b>Appropriate disposal of equipment</b>	Clean and proper dressing.	1 Improper disposal or failure to dispose materials	2	3 Delayed or partial disposal of materials	4	5 Prompt and proper disposal of materials



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HUMAN ETHICS COMMITTEE  
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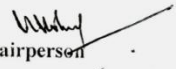
IEC.No:-030/17 Date: 27-11-2017

Approval of Institutional Human Ethics Committee

This is to certify that the proposal for the research study “Different Modalities for acquisition of better suturing skills – A comparative study between video based learning and simulator based learning” submitted by **Dr.Affin A, Associate professor, Department of General surgery, Travancore Medical College, Kollam**, has been approved by the I.E.C meeting held on 27-11-2017 for undertaking the study for a period of 2 months from the date of ethical clearance.



  
**IEC Convener**  
**MEMBER SECRETARY**  
Human Ethical Committee  
Travancore Medical College, Kollam

  
Chairperson

**Please Note:**

- The permission is only for the period mentioned above.
- No deviation from the approved protocol shall be made without the prior consent of IEC.
- IEC should be informed about the progress of the study every six months for continued approval.
- IEC should be informed about any severe adverse effects occurring during the period of the study.
- Members of IEC have the right to monitor trial with prior intimation.
- Immediately on completion of the project, the final report should be submitted to IEC for decision and closure within one month.
- The confidentiality of cases identified should be strictly maintained

**CONSENT FORM**

I.....the undersigned hereby state that I am willing to take part in the study “ Different modalities for acquisition of better suturing skills – A comparative study“ explained by Dr.Affin .A I have been explained about the procedures and assessment methods which I have to undergo as part of this program.  
I agree to abide to the instructions of Dr.Affin A with regards to the above and state that I am doing so of my own free will.

Dr AFFIN.A" ‘Different Modalities For Acquisition Of Better Suturing Skills- A Comparative Study." IOJR Journal of Dental and Medical Sciences (IOJR-JDMS), vol. 17, no. 9, 2018, pp 56-64.