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# Impact of structured training of basic surgical skills in controlled environment for first-year postgraduate students of surgical specialties

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## Abstract:

**BACKGROUND:** Appropriate training and obtaining adequate competency in basic surgical skills is very essential for a fresh postgraduate in surgical specialties to deliver effectively various responsibilities. Due to absence of any methodology to assess these skills before entry into the surgical residency program, anxiety and low confidence regarding the skills, there is delay in allotting graded responsibilities by the faculty and seniors. Hence a short structured training program to address these skills was planned and implemented.

**MATERIALS AND METHODS:** One hundred and forty two trainees underwent this course in last five years. The training included very basic surgical skills demonstrated and hands on training in controlled environment of clinical skills laboratory. Secondary outcome was assessed for available forty three trainees.

**RESULTS:** The immediate feedback suggested that the training was necessary, very useful and perception wise the trainees felt their competencies improved significantly from 60 -80%. They also opined that these facilities should be allowed to use regularly and all of them opined that they wish to be assessed after three months to assess internalization of skills obtained. Retention test was conducted for 43 available postgraduates in the form of OSCE. Their scores revealed good improvement in the skills by 60-80% suggesting the utility of the training and improvement in the competencies.

**CONCLUSION:** Training of various basic surgical skills in a controlled environment improves competencies of fresh postgraduates, improves their confidence and reduces time for allotting graded responsibilities

## Keywords:

Basic surgical skills, controlled environment, skills laboratory, surgical simulation

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The goals of the postgraduate degree program in surgical specialties are to train medical graduates into competent surgeons who are capable of delivering effective surgical care to the patients. Surgical programs demand good competency in

psychomotor skills as patient outcome is significantly dependent on these skills. Adequate training in the skills forms a major component of their training. However, in the present scenario, these skills are not assessed before entry into the course in our country. Most of the interns or house surgeons tend to concentrate on preparation

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for the eligibility test which is purely knowledge based. This leads to sidelining of the priority of acquiring basic surgical skills. Hence, the student, however, reasonably confident of knowledge in surgery, lacks competence in skills. This undermines the confidence of the students and their facilitators forming barrier in allowing them to take up graded responsibilities.

Apprehension regarding their proficiency in basic skills prevents them from volunteering to perform or allotting of responsibilities by their peers which need some reasonable competencies. Keeping this gap in the present scenario, a short structured training program was planned, initiated, and implemented. This program focused on addressing the most basic skills required in operation theaters. Fresh first-year postgraduates from surgical specialties were chosen because all of them needed these skills. This course was conducted in the controlled environment of clinical skills laboratory since 2013. After 2 years of conduction of the program, a retention test was implemented and conducted for the last 3 years to assess the outcome and effectiveness of the program. This article attempts to review the program and its outcome.

## Methodology

The clinical skills laboratory conducts various training programs in basic surgical skills, basic life support skills, other clinical examination techniques, and procedures required for interns, postgraduates, and paramedical staff regularly. The data of workshops conducted for first-year postgraduates for the last 5 years were collected here and analyzed. The study was conducted after IEC clearance with informed consent of the students.

The course was conducted to all first-year postgraduates of surgical specialties for 3 consecutive years. All the first-year postgraduate students of surgical specialties, namely, general surgery, OBGY, ENT, ophthalmology, and orthopedics, were included. First-year postgraduates of general surgery from neighboring medical colleges also participated. A 2-day structured training program of 12 h in the controlled environment of clinical skills laboratory was conducted. A pretested questionnaire [Table 1] was given and compared with posttest feedback [Table 2].

The course covered various aspects of very basic surgical skills required in operating rooms. It included brief information of 5–10 min with power point demonstration/video followed by actual demonstration by the faculty. Later, every student was given adequate hands-on training. The areas dealt were:

1. Universal precautions
2. Dressing materials and methods

### Table 1: Preworkshop questionnaire

1. Have you gone through the schedule of the workshop?
2. Which session is the most needed by you?
3. Which session you feel is not required?
4. How much do you expect the improvement in your skills at the end of the practice?. 0-25%/26-50%/51-75%/>75%
5. Do you think you need to have such classes more or use this facility at your convenience?
6. How will you use this facility further?
7. What additions/deletions/modifications you want in this workshop?
8. Would you like to review the outcome of this learning as a test after 3 months?
9. Any other comments.

### Table 2: Feedback after workshop

Overall	Excellent	Very good	Good	Average	Poor
Content					
Presentation					
Demonstration					
Practice time					
Session wise					
Session I					
Session II					
Session III					
Session IV					
Session V					
Session VI					
Session VII					
1. Which session was the most needed by you?					
2. Which session you felt was not required?					
3. How much was the improvement in your skills at the end of the practice?					
4. Do you think you need have such classes more or use this facility at your convenience?					
5. How will you use this facility further?					
6. What additions/deletions/modifications you want in this workshop?					
7. Would you like to review the outcome of this learning as a test after 3months?					

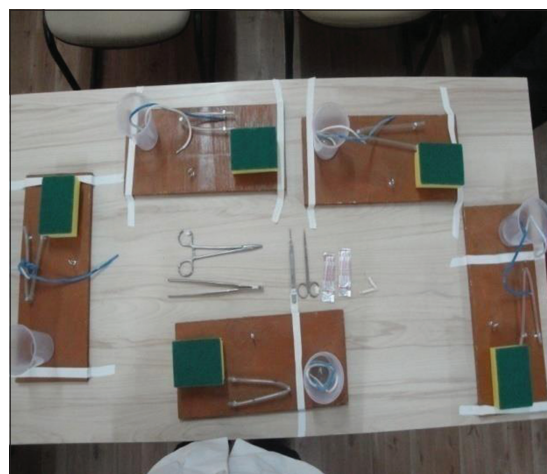


Figure 1: Custom-made suturing knotting board

3. Gowning and gloving techniques
4. Suture materials, instruments, and methods



Figure 2: Workshop and wet lab using bovine intestine



Figure 3: Workshop and wet lab using bovine intestine

5. Suturing and knotting techniques
6. Incision making and suture removal
7. Wet lab using animal tissue for tendon repairs and resection and anastomosis of bowel.

Actual gowning and gloving was demonstrated and adequate hands-on experience was given. Incision making, suturing, and suture removal were taught on suturing boards. Knotting and various types of knots were taught on the same boards [Figure 1].

Appropriate use of instruments and correct handling was demonstrated and students were asked to practice until reasonable proficiency was achieved. Resection and anastomosis and tendon repairs were taught and practiced using bovine limbs and gut [Figures 2 and 3].

During hands-on sessions, training was given with the help of senior postgraduates who acted as mentors during the course. Feedback was obtained regarding utility and quality of various sessions of training [Table 2].

They were asked to grade from 5 to 1 on Likert's scale, with 5 being excellent and 1 being poor. Apart from this, they were asked about the perceived improvement in their skills percentage wise. Suggestions for improvement were also sought. After training, these students worked in the focus area regularly as a part of their clinical needs. A retention test was planned by the faculty after 3 months with an assumption that this is the expected time to internalize the skills taught and appropriate time to assess them. At the end of 3 months, a retention test was conducted by Objective Structured Clinical Examination (OSCE) method using check lists.

The areas covered in OSCE were:

1. Gowning and gloving by closed method
2. Painting or part preparation and draping for open appendicectomy/laparotomy on the manikins

3. Identification of suture material and its uses
4. Putting horizontal mattress suture on the suture board
5. Suture removal
6. Putting square knot on knotting board
7. Resection and anastomosis of bovine gut using single layer closure technique.

OSCE test was conducted with seven stations as per the skills covered during the training session. Third-year postgraduates were involved as observers for these stations so that they could get firsthand information on the outcome of their mentorship. It was also a learning experience in the form of learning observation skills.

A total of 142 postgraduate students attended the workshop. Initially, for 3 years, only structured training was conducted. Later, it was felt that there was a need to assess the impact of this program. Hence, retention test in the form of OSCE was planned for 2015, restricted to postgraduates of general surgery. For the last 2 years, the test has been extended to all the postgraduates of the institute who were trained during workshop. Due to clinical commitments, students from other institutes were not invited for retention test and few of the first-year postgraduates could not make it to the retention tests. Hence, the total of 43 residents attended the workshop and retention test. Their scores of OSCE were analyzed to assess the internalization of the skills taught.

## Results

A total of 142 of postgraduates were trained in 5 years. Forty-three residents attended retention test.

Analysis of pretest questionnaire showed that:

1. All wanted the training (142)
2. Majority did not have any similar experience

**Table 3: All rated the contents, presentation, demonstration, and practice as excellent or very good**

	Excellent	Very good	Good	Average	Poor
Content	73	29	2	-	-
Presentation	75	27	2	-	-
Demonstration	82	21	1	-	-
Practice time	69	27	8	-	-

**Table 4: Session wise analysis showed similar results**

	Excellent	Very good	Good	Average	Poor
Session I	94	31	3	-	-
Session II	107	22	1	-	-
Session III	96	23	6	-	-
Session IV	95	35	-	-	-
Session V	102	22	6	-	-
Session VI	112	16	2	-	-
Session VII	103	21	6	-	-

earlier (123), 20 of the postgraduates had exposure as interns at our institute

- Majority felt that all sessions will be useful (138)
- Their expectation of improvement after training ranged from prior level to >25% =20%, 26%–50% =36%, 51%–75% =74%, >75% =12%
- All wanted retention test.

Feedback was taken at the end of training to assess the reaction.

A total of 130 completely filled feedback forms were analyzed.

Analysis of feedback after training is shown in Tables 3 and 4.

### The responses to the questionnaire

- Which session was the most needed by you?
  - Gowning and gloving = 08
  - Suture materials, and suturing techniques and knotting = 83
  - Anastomosis of bowel using bovine intestine = 20
  - All session needed = 102
  - Tendon repair = 32.
- Which session you felt was not required?
  - Gowning and gloving session = 20
  - Tendon repair and suturing = 08.
- How much was the improvement in your skills at the end of the practice?
  - 0%–25%=08%
  - 25% to 50% =34%
  - 50% to 75% =56%
  - >75% =32%.
- Do you think you need have such classes more or use this facility at your convenience?
  - More classes = 76
  - Use the facility at convenience = 54.

- How will you use this facility further?
  - To practice and attain perfection is suturing techniques = 103
  - To implement it practically in casualty and operation theaters = 121.
- What additions/deletions/modifications you want in this workshop?
  - Basics about laparoscopy can be included = 34
  - Better instruments = 12
  - Few more practice sessions/More time for the doing practice = 56
  - No modification. This is good session = 94.
- Would you like to review the outcome of this learning as a test after 3 months?
  - Yes = 130.

In the column for any other comments, there was reflection of same opinions. In general, they were happy and thankful for conduction of workshop and appreciated the personal attention by faculty and senior postgraduates.

Analysis of the scores of retention test conducted by OSCE at the end of 3 months showed significant improvement in the skills. The maximum score was 110 together for 07 stations. These scores were converted to percentages. It was observed that all the student had scores of minimum 68% to maximum of 81%, suggesting good competency in the skills taught. The students were given feedback on their positives and areas where they need to improve.

Range of scores for 43 postgraduates:

- Below 50% = nil
- 50% to 60% =02
- 61% to 70% =15
- 71% to 80% =19
- 80% to 90% =07
- 90% and above = 0.

Overall scores showed evidence of reasonable competency and internalization of skills to a good extent.

### Discussion

The present scenario in medical education and patient care demands perfection and error free performance by the clinicians, more so from the surgical fraternity as the stakes are high. Patient safety is a priority.<sup>[1]</sup> In such situation, trainee surgeons end up often as observers or second assistants during early training period. This is often due to apprehension of the seniors and faculty in assigning them independent responsibility as they are not confident of the delivery of skills at expected levels. This undermines the confidence of trainees and increases the workload on seniors. Ultimately, this leads to delay in acquiring appropriate competencies.

Although operating rooms no doubt are the best places for picking up these skills, it may not be possible when there is high turnover of surgeries and time management becomes a priority. In such scenario, proper training becomes a casualty.<sup>[2]</sup> It should be remembered that level 1 to level 3 (shows how) in Miller's Pyramid<sup>[3]</sup> for training and assessing clinical competencies need not necessarily be in a real-time setting. Direct training in real-time setting is often stressful to the learner. First-year postgraduates felt that they lacked skills which hindered their patient care and opined that they should have been trained more in these areas.<sup>[4]</sup> In such situation, learning the skills in a simulated and controlled environment helps the learners to understand, perform under supervision, make mistakes without apprehension of harming the patient, and interact freely with the facilitators. Simulation-based learning methods have been accepted in variety of learning settings and are complimentary to actual clinical learning.<sup>[5]</sup> Clinical skills laboratories have a major role to play in such scenario. There is good evidence acknowledging the advantage these laboratories provide.<sup>[6]</sup> Basic or advanced skills can be taught and learned well. Deliberate practice with structured training improves performance.<sup>[7]</sup> Once level three is achieved here, the learners can be encouraged to do it under observation in real-time setting and internalize the skills. At present, these types of facilities are coming up in many medical schools, but appropriate utilization is lacking for want of awareness regarding its utility, its advantages, and lack of trained faculty to conduct these programs. Due to lack of awareness, there is often question mark on credibility and skepticism regarding such programs. Retention tests<sup>[8,9]</sup> are one of the standard methods to test secondary outcome based on Kirk Patrick's evaluation model.<sup>[10]</sup> Simple bench top model simulators similar to what we have used have shown to test the skills of resident and can predict them.<sup>[11]</sup> Internalization needs to be tested using 360% evaluation or work place-based assessment,<sup>[12]</sup> which is in nascent stages at present in our country. With the major changes in the national medical education policies and shift toward competency-based medical education,<sup>[13]</sup> such programs and assessment methodologies are going to play a major role in future.

## Conclusion

Structured skills training for variety of basic skills is essential in the present scenario where entry into surgical residency is solely dependent on the assessment of only knowledge of the student. These programs

should be part of the curriculum at the beginning of the residency. Well-planned and conducted training improves competency and increases the trust levels of trainers and confidence in learners. Review of learning and assessment in simulated environment gives objective feedback regarding the skill levels of the learners and encourage the trainers in allotting the independent responsibilities with better patient outcomes.

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## Conflicts of interest

There are no conflicts of interest.

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