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ORIGINAL ARTICLE

# Training in Basic Surgical Skills: Need of the Hour

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**Abstract** One of the major components of medical education is training individuals in various skills related to health care. Training directly on patients has its challenges due to limited opportunities, concerns for patient safety and reluctance of patients. Clinical Skills Laboratory provides a stress-free environment for learning and honing skills under direct supervision. Surgery is predominantly a craft-based branch of medicine and undergraduate medical students have very little exposure to it. With an objective of improving basic surgical skills and improving the competency, a short-term training programme in the form of a workshop was planned, executed in a dedicated Clinical Skills Laboratory for interns posted in the surgical branches. The core areas of training were basic surgical skills required in day-to-day practice in the surgical specialties. Five broad categories of skills, gowning and gloving, instrument handling, knot tying, suturing techniques and universal precautions, were dealt with demonstration and hands-on practice sessions. A total of 14 skills lab training sessions over a period of 3 years from February 2014–March 2017 were conducted where a total of 264 interns participated. Analysis of the feedback showed 62.87% of the participants felt that the content was excellent, 63.63% opined that the presentations were excellent, 76.13% appreciated the demonstration and 60.6% were satisfied with the time allotted for practice sessions. This short-term training in basic surgical skills in a controlled environment helped in improving the interns' skills and confidence. Implementation of basic surgical skills training provided a complementary experience that facilitates the shortening of the learning curve and enhances the ability of the new doctors to perform various procedures. This model of training in skills laboratories could be inculcated in the curriculum as practical training for effective delivery of health care.

**Keywords** Surgical skills · Simulation · Training model · Peer-assisted learning · Medical curriculum

## Introduction

One of the major components of medical education is training individuals in various skills related to health care, be it clinical skills, behavioural skills or communication skills. Knowledge component can be obtained by various resources. But, appropriate training in clinical and surgical skills is essential for producing a competent health care professional. Training directly on patients has its challenges due to limited opportunities, safety of patients is a concern and reluctant patients also limit the chances.

In such scenario, Clinical Skills Laboratory provides a stress-free environment for learning and honing skills under direct supervision.

Surgery is an important part of the curriculum of the undergraduate medical students and requires practical application of the knowledge of all basic sciences relevant to surgical diseases. Surgery is a branch which is a skill-based speciality and there is limited exposure and access to training in psychomotor skills for the undergraduate students. Since surgery is seldom projected to the students as a craft or an art-oriented branch, it hinders doctors from taking it up as a future career option [1]. When medical students enter clinical internship, it is observed that most of them have very little orientation and knowledge about basic surgical procedural skills. Further, it is seen that even a single formal training session in the initial

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period adds to the competence and confidence of the medical students [2]. In the present era of speciality surgical training programmes which are becoming more demanding, it becomes necessary that graduates entering residency/core training/internship have good basic surgical skills and are reasonably competent. This will help them to progress swiftly and efficiently in a time-bound manner in the current scenario with limited training opportunities [3]. Developing cognitive, clinical and technical skills are the main objectives of surgical training. Clinical and technical skills have been conventionally garnered through mentoring. The lack of appropriate mentoring opportunities makes the establishment of clinical skill laboratories very relevant in the current scenario [4, 5].

Suturing the skin, basic wound care and administration of local anaesthetic are some of the practical skills which are essential to most specialities, but unfortunately, a majority of the new doctors lack proper training in these procedure-based skills [6]. Many interns are unable to competently and safely perform these skills as graduating doctors due to low levels of procedural skills training.

## Material and Methods

A single-day training programme in surgical skills targeted at the interns/house surgeons was developed. Curriculum was designed so as to teach basic surgical skills along with adequate hands-on training. Simulation models and suturing and knot practice board for the surgical skills were created with locally available materials. The curriculum was planned and reviewed by all the senior faculty of the department, and various procedural skills required for assisting in surgery appropriate for the undergraduate level were included. Five broad categories were identified under which the various skills could be grouped.

1. Gowning and gloving techniques
2. Handling of instruments
3. Various knots and knotting techniques
4. Suture materials, suturing techniques and suture removal, etc.
5. Universal precautions, asepsis and antisepsis

Every 2 months, a workshop was conducted in a dedicated Clinical Skills Laboratory established for this purpose for the batch of interns who were posted in the surgical branches. The timing of the workshop was planned so that the interns could learn the skills when they needed it and could use it during postings. There were five sessions for each of the five broad categories of skills mentioned above, with a 10-min audio-visual presentation and demonstration of skills followed by a hands-on training sessions. Theoretical information was kept to minimum with main stress on demonstration and hands-on training.

Using locally available materials, a unique practice board (Fig. 1) was developed so as to facilitate the demonstration and practice of knotting skills and suturing techniques. This cost-effective and reusable board employed in our basic surgical skills lab was used to demonstrate skin incisions, closure and suture removal, different types of suturing and various basic surgical knots.

All the students were monitored during the hands-on session by faculty and third-year post-graduates who acted as mentors (Fig. 2). The average number of trainers to trainees was 1:3. Trainees were assisted and guided until they were able to perform the procedures with reasonable competency. Feedback was obtained from all trainees at the end of training and analysed. It had four parameters—course content, presentation, demonstration and practice time—each of which had to be graded as either excellent, very good, good, average or poor. The data collected from all the 264 students who attended the workshop from February 2014 to March 2017 was compared and analysed.

## Results

A total of 14 skills lab training sessions over a period of 3 years from February 2014–March 2017 were conducted and 264 interns participated in total (Table 1). An average of 18 interns attended each session and the feedback obtained from them was tabulated and analysed. Of the participants, 62.87% felt that the content was excellent and 32.5% felt it was very good and none rated it as average or poor. The audio-visual presentations were also equally appreciated by the participants and felt that they were very informative and practical oriented with 63.63% rating it as excellent (Table 2).

The demonstration of gowning and gloving, instrument handling, knotting, suturing and universal precautions were very appealing to the participants which explained the correct method of doing the procedures in the clinical setting and at the same time cautioned them about the common mistakes committed by beginners. The demonstration session was rated as excellent by 76.13% of the participants and none rated it below average.

Every effort was made to allot sufficient hands-on experience and practice time to all the participants with the maximum time being allotted for suturing and knot tying techniques and most of the participants (60.6%) felt that the time allotted was excellent and sufficient and 2.65% felt that it was average with room for some improvement.

## Discussion

Surgical specialty has progressed in leaps and bounds in the last three decades. With the advent of highly technical investigative

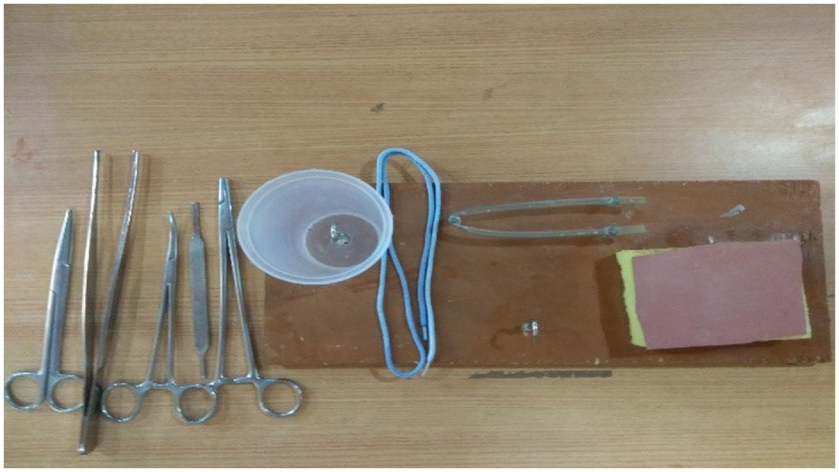

**Fig. 1** The bench top practice board

and therapeutic tools, surgical procedures have become highly specific and precise with reduced morbidity. Effective training is required before a doctor can use these tools. Among the three major domains of learning for a doctor, viz. knowledge, psychomotor skills and affector domains which includes communication and ethics, knowledge is gained by various teaching/learning methods with existing facilities. Good training in the affector domain needs different training methods. Learning skills, however, is a major challenge because opportunities for learning are limited, safety of patients during training is a concern and the expectations of patients and society are high. This has led to reluctance on the part of trainers to allow sufficient hands-on training on patients directly.

Four levels of competencies in medical education are described as depicted in the Miller's pyramid (Fig. 3)—knows, knows how, shows how and, finally at the top, does [7]. The first three components of competencies are addressed to a great extent by simulated training, thereby reducing the delay in learning. Some have suggested that there should be a higher level of 'does well' corresponding to an expert. And, this should be the goal of training. 'Does well' probably requires more time for practice (experience) than can be achieved during training and indicates the need for continued learning [8].

Several studies have pointed out that confidence is an important tool for developing competency in various procedures and surgical skills. It was observed that among the third-year medical school students, a significant majority of students lacked self-confidence in performing skills they were not regularly exposed to, thereby highlighting the importance of student self-confidence as an important entity to inculcate and develop adequate skills in performing procedures [9].

Gowning and gloving is the first basic skill regardless of seniority and it is a prerequisite for performing any aseptic procedure either in emergency, wards or operating rooms.

**Fig. 2** Skills lab session in progress

**Table 1** Year-wise activities

| Year | No. of activities | No. of interns |
|---|---|---|
| 2014 | 5 | 81 |
| 2015 | 5 | 92 |
| 2016 | 3 | 51 |
| 2017 | 1 | 40 |
| Total | 14 | 264 |

Hence, all medical graduates should be acquainted with it. Over two thirds (about 70%) of medical schools in England were taught gowning and gloving. But, training for commonly practiced procedural skills such as basic suturing was present in only a quarter of medical schools curricula (24.7%) and surgical societies bridged this gap by providing training and opportunity for practice in knot tying and suturing skills [10].

Surgical skills training is not given adequate importance in the curriculum for undergraduates; and hence, students are rarely exposed to those aspects of surgery which are essentially craft based. Students perceived basic surgical principles highly relevant and a majority felt that the level of proficiency achieved at the undergraduate level is much less than anticipated [11]. Skills laboratories and simulators are increasingly being employed in post-graduate training and have become very advanced in replicating reality. But, this method is underutilised for training undergraduates or interns in spite of its advantages. It was observed that students' confidence and perception in understanding common surgical problems improved while preparing for surgical internship with the use of the interactive approach during surgical skills workshops [12].

The training in basic surgical skills makes surgery a more attractive career option to choose for graduates and helps them to take up surgical specialities as their career [13]. These various studies suggest the need for systematic surgical skills training and adequate dedicated time for practice of these skills at the undergraduate level and emphasise its inclusion as one of the core competencies.

Surgical skill labs bridge the essential gap in teaching surgical skills and provide an educational environment in which specific time can be devoted to the development of various skills. Although these facilities cannot substitute the learning provided by actual clinical experience, they establish a foundation for the learners to acquire a range of skills that can subsequently be honed and eventually made much stronger during the surgical practice [14].

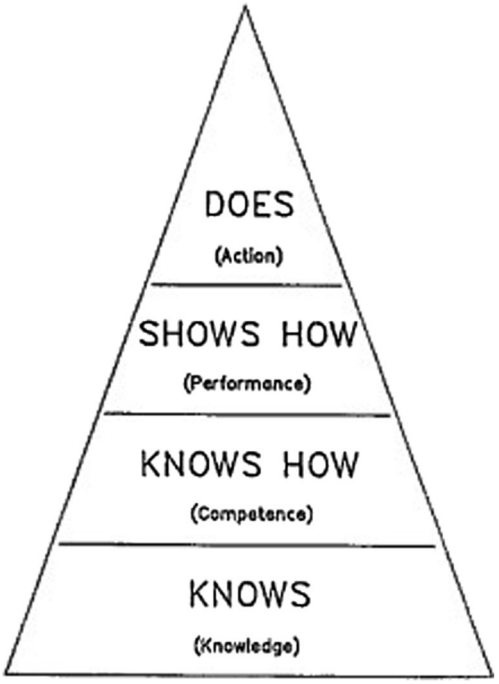


**Fig. 3** Miller's pyramid [7]

Integration of simulation-based learning into health care education will provide a partial substitute for practice on actual patients without apprehension of harming patients in a safe and secure environment where students can learn from their mistakes. The curriculum can be designed according to the specific needs and at the same time ensure year-round availability for practice. Keeping up with the fast advancing and complex medical technologies is stressful but that challenge can be met with the simulated learning process, as well as the need to ensure uniform learning field and patient safety through quality educational inputs [15, 16].

Further assessment of the students on a simulator in a skills lab is easier than in an operating room due to the risk-free and controlled environment. Simple bench-top simulations and live animal simulations have been used by adopting Objective Assessment of Technical Skills (OSATS) with reasonable reliability [17].

This model of training in surgical skills has a potential to be modified and implemented for various groups of trainees as per their curriculum and desired practical skills. There are, therefore, several categories of simulation that can be considered useful for training: (i) inanimate artificial tissues and

**Table 2** Compilation of data from the feedback forms

| | Excellent | Very good | Good | Average | Poor |
|---|---|---|---|---|---|
| Content | 166 (62.87%) | 86 (32.5%) | 12 (4.54%) | 0 | 0 |
| Presentation | 168 (63.63%) | 81 (30.68%) | 15 (5.68%) | 0 | 0 |
| Demonstration | 201 (76.13%) | 54 (20.45%) | 9 (3.40%) | 0 | 0 |
| Practice time | 160 (60.60%) | 76 (28.78%) | 21 (7.95%) | 7 (2.65%) | 0 |

organs; (ii) fresh tissue or animal models; and (iii) virtual reality and computerised simulation [18]. There have been simulation models for training in robotic surgery in recent times. A standardized training module to allow practice in visceral and vascular surgery along with a qualitative and quantitative evaluation of the surgical performance was developed and it was observed that such a training in robotic surgery helped to improve manual skills and shorten the learning curve [19]. Simulations will form the basis for technical skills training and assessment in the future because of the decreasing opportunity to practice on real patients and the need for 'deliberate practice' in a non-threatening environment [20, 21].

Although our training model did not have any provision for assessment of the trainees at the end of the session, any such modification will definitely improve the effectiveness of this model. Further, there is scope for implementing validated methods that allow objective assessment of surgical skills according to the level of expertise expected from a particular group of trainees. Such training and evaluation programmes can be implemented as a part of surgical education [22].

## Conclusion

The goal of implementing basic surgical skills training is to provide a comprehensive experience that accelerates the learning process and improves the ability of the new doctors to perform various procedures thereby making them more competent. This simple model of training of basic surgical skills in a skills laboratory should be inculcated in the curriculum for undergraduates and interns as a mandatory training method which will boost the confidence and improve skills with resultant effective patient care. This reduces the time taken for learning allowing for quicker transition to allot graded responsibility in the residency system of surgical training. This model is scalable and can be modified to include advanced surgical skills and implemented for a variety of skills required for different groups of learners as well thereby improving the overall skills of the emerging generation of doctors.

#### Compliance with Ethical Standards

**Conflict of Interest** The authors declare that they have no conflict of interest.

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