



NEAR-PEER TEACHING METHODS FOR IMPROVING BASIC SURGICAL SKILLS OF INDIAN MEDICAL GRADUATES – A CONTROLLED COMPARATIVE STUDY

Medical Education

Dr. Kiran Gaikwad*	Associate Professor, Department Of General Surgery, Terna Medical College, Nerul, Navi Mumbai. *Corresponding Author
Dr. Madhuri Dhabarde	Professor, Department Of Anesthesia, Terna Medical College, Nerul, Navi Mumbai.
Dr. Nilesh Ghorpade	Associate Professor, Department Of Orthopedics, Terna Medical College, Nerul, Navi Mumbai.
Dr. Dnyanesh Belekar	Professor & HOD, Department Of General Surgery, Terna Medical College, Nerul, Navi Mumbai.

ABSTRACT

Background: Near-peer teaching (NPT) is a TL Methodology where the trainer is one or more academic years senior than the person being trained. There are very few publications that studied NPTs effectiveness although the literature agrees on the benefits of NPT method. Our study was aimed at evaluating effectiveness of NPT in the training of basic surgical skills. **Methods:** 100 Final M.B.B.S students were divided in 4 equal batches of 25 students in each batch and each batch participated in surgical skills course. All batches completed the same curriculum. Two batches were trained by NPT tutor (Fresh Medical Graduates i.e. Interns) and remaining two batches were trained by senior faculty members. Pre and post course tests were taken which were supervised and evaluated by senior faculty. Test results were analysed and students feedback obtained by online questionnaire. **Results:** In students group trained by NPT tutor performance improved with completion of the course (median total marks scored increased from 23.5 to 41.5 marks $p < 0.01$). While students group trained by faculty members (median total marks scored increased from 22.5 to 42.5 marks $p < 0.01$). Students feedback on overall satisfaction for NPT tutor group was 4.5 and for faculty trained group was 4.8 on a scale of 5. **Conclusions:** Near-peer teaching is equally effective in basic surgical skills training as a conventional faculty assisted training.

KEYWORDS

Near-peer teaching, Basic Surgical skills, Suturing, Urethral catheterization.

BACKGROUND

Near-peer learning is rapidly gaining acceptance as effective way of learning methodology and there are multiple research articles on NPT in medical literature. "Near-peer teaching" is the term introduced by Whitman in 1988. Bulte et al defined near-peer tutor as a trainee who is one or more years senior to another trainee on the same level of medical education training. Topping defined peer education as individuals from a similar social group who, as non-professional educators, help each other in learning and learn by teaching themselves.

Although several publications have reported positive changes like development of confidence and better understanding using NPT method, these are based on subjective impressions and opinions. Very few studies examined the effectiveness of NPT using objective and prospective methods. A study by Preece et al.[10] Examining the effectiveness of NPT method in teaching surgical skills, found that the use of peer- assisted learning as an effective, cheap and sustainable way to teach basic surgical skills.

Rationale for peer teaching, and a possible explanation for many positive outcomes is "cognitive congruence" a concept described by Lockspeiser et al.[14] As per Rodrigues et al.[15] junior doctors are effective near-peer teachers as their added experiences as a doctor, combined with their recent experience of medical school examinations, provides informed insight. Peer teaching also provides a benefit to these fresh medical graduates as peer tutors who can consolidate their knowledge to prepare content, gain teaching experience and receive formal teacher training. Junior doctors/ Interns are well placed to teach students as they share recent experiences and are familiar with the assessment process.

In this era of competency based medical education National Medical Council of India has made a commitment to create an Indian Medical Graduate efficient in most of the basic competencies.

Challenges in implementing CBME in General Surgery Curriculum for undergraduates are:

Lack of motivated Teachers and shortage of Faculty

Practical limitations due to emergency clinical work

Time and Infrastructure constraint

In spite of tremendous advancements in most of specialties of medical practices over last couple of decades, fresh medical graduates are devoid of basic surgical skills, this leads to poor patient care and final outcome of patients health. We can overcome this problem by using Near-Peer teaching method for training students in basic surgical skills.

Methods

The aim of our study was to investigate the effectiveness of NPT in implementing basic surgical skills course to final M.B.B.S students and the objective was that the final year M.B.B.S student should demonstrate the desired competency in basic surgical procedures like:

1. Urethral catheterization
2. Suturing technique

Our Hypothesis Is That:

NPT has positive impact on exam results of students participating in the basic surgical skills course.

NPT improves satisfaction of students participating in the course.

This study was conducted at tertiary care medical college hospital in the department of general surgery.

Study Design: Prospective, controlled, parallel group, comparative study.

Study Duration: Study duration was three month.

We included all 100 Final year M.B.B.S volunteer students in this study. Written informed consent was obtained from study participants. All participant agreed to take part in the study, and approved to use their data for research purposes. 50 students in study group and 50 students in a control group. After taking approval from Institutional Research Committee & Ethics committee, sensitized Faculty trained 5 Interns posted in Surgery department for two weeks in two procedures, 1) Urethral catheterization & 2) Wound suturing with adequate competency. These trained Interns taught these procedures to students of Study group.

Five volunteer peer educators were also involved in the study. These NPT tutors were Interns posted in General Surgery department, they

trained the study group students.

Faculty consisted of five teachers (Senior Instructors) working in the department of General Surgery with a designation of assistant professor and above. They trained the control group students as well as did assessment of both study and control group in pre and post course assessment test.

Study Protocol

All students underwent a pre course test to assess their existing knowledge and skills in urethral catheterization and basic surgical suturing techniques. Test was assessed by all senior instructors.

1. We divided students into the 5 groups according to their performance in pre test from poor to excellent. Then we made ten homogenous groups of 10 students in each group by putting 2 students from each of the original five groups.

2. Five study groups assigned to 5 NPT tutors and other five control groups assigned to Teaching faculty ((Instructors).

3. All groups took 10 training sessions of 45 minutes each, with the same timeline on different weeks:

a) In depth discussion on indications, procedure, observing aseptic precautions and complications of urethral catheterization – 45 minutes.
b) Actual urethral catheterization procedure observing complete asepsis on a Mannequin in a skills lab by each students of a group- 4 sessions of 45 minutes.
c) In depth discussion on instruments required, types of suture materials, types of suturing techniques and observing aseptic precautions during suturing – 45 minutes.
d) Actual suturing on suturing pad using atraumatic suturing material and instrumental knot in a skills lab – 4 sessions of 45 minutes.

4. At the end of the course skills were assessed by faculty instructors with Directly Observed Procedural Skills (DOPS).

5. Students feedback regarding their opinion about the course was taken by online questionnaire on Likert scale of 5

Assessment Protocol

Faculty instructors did assessment based on DOPS. To evaluate catheterization we developed our own criteria system(Table 1). To evaluate the suturing we used slightly modified version of the criteria published by Zsolt Pinter et al.[16](Table 2).

A) Urethral catheterization on a Mannequin evaluated according to DOPS (Table 1).

B) Simple interrupted suture with atraumatic suturing material and instrumental knot with suture pad (three pieces) evaluation according to DOPS (Table 2).

Table 1: Score System Used For Assessment Of Urethral Catheterization On A Mannequin

Marks	1	3	5
1.Maintaining Asepsis	Did not reach	Accidently violated	Reached
2.Proper urethral lubrication	Not used adequate amount	Clumsy movements	Did it properly
3.Properly holding & passing catheter	Unable to pass	To many jerky movements	Passed catheter effortlessly
4.Inflating Foleys balloon rightly	Could not inflate	Inadequately inflated	Inflated properly
5.Attaching Foleys to urine bag	Did not attached	Too much of spillage	Done accurately
TOTAL Marks			25

Table 2: Score System Used For Assessment Of Suturing Techniques

Marks	1	2	2.5
1.Hold the needle at 1/3 rd	Not even once	Sometimes	Always
2.90degree between needle & surface	Not even once	Sometimes	Always
3.Appropriate usage of forceps	Wrong	Intermediate	Excellent
4.Appropriate direction & technique of knotting	Wrong	Intermediate	Excellent
5.Appropriate tightness of the knot	Wrong	Intermediate	Excellent
6.Appropriate position of the skin edges	Wrong	Intermediate	Excellent

7.Appropriate distance from the skin edges	Wrong	Intermediate	Excellent
8.Appropriate distance between sutures	Wrong	Intermediate	Excellent
9.Time & motion	Did not finish within 5 minutes	Finished in time but to many movements	Finished effectively in time
10.Maintenance of asepsis	Did not reach	Accidently violated	Reached
Total Marks			25

RESULTS:

Comparison of pre & post scores of Control Group

The Median test score by D.O.P.S for Urethral catheterization pre training was 11.5 while post training it improved to 20.5. ($p=0.06$) Median D.O.P.S test score for Suturing Techniques pre training was 12.5 while post training it improved to 22 ($p<0.01$). Total marks scored increase from 24 to 42.5($p<0.01$)

Comparison of pre & post scores of Study Group

The Median test score by D.O.P.S for Urethral catheterization pre training was 11.5 while post training it improved to 20 ($p=0.065$) Median D.O.P.S test score for Suturing Techniques pre training was 12 while post training it improved to 21 ($p=0.068$). Total marks scored increase from 23.5 to 41 ($p<0.01$).

Table-3: Pre and Post course Test Result of Control Group

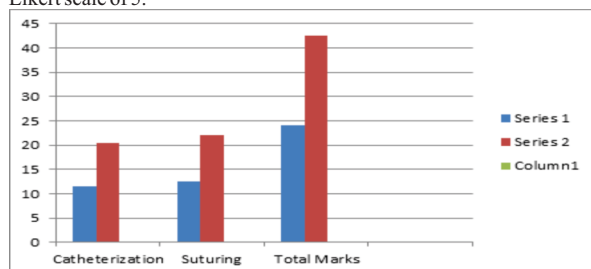
Parameters	Pre course Marks Median	Pre course Marks Range	Post course Marks Median	Post course Marks Range	P Value
Urethral catheterization D.O.P.S score out of 25 Marks	11.5	(10 – 13)	20.5	(18 – 23)	0.067
Suturing Technique D.O.P.S score out of 25 Marks	12.5	(11 – 14)	22	(21 – 23)	0.069
Total Marks	24	(21 – 27)	42.5	(39 – 46)	0.01

Table-4: Pre and Post course Test Result of Study Group

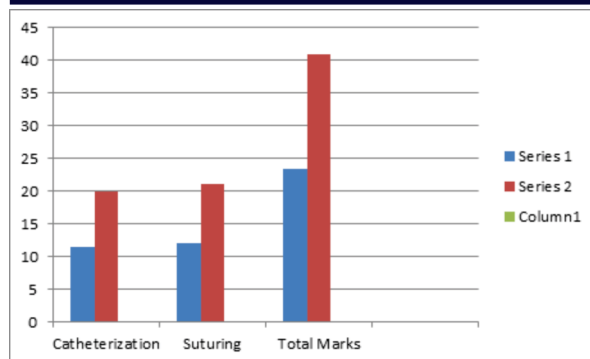
Parameters	Pre course Marks Median	Pre course Marks Range	Post course Marks Median	Post course Marks Range	P. Value
Urethral catheterization D.O.P.S score out of 25 Marks	11.5	(10 – 13)	20	(18 – 22)	0.065
Suturing Technique D.O.P.S score out of 25 Marks	12	(11 – 13)	21	(20 – 22)	0.068
Total Marks	23.5	(21 – 26)	41	(38 – 44)	0.01

Taking into account the overall results of the students, a significant improvement was achieved in all areas during the completion of the course..In the group where NPT tutors assisted the teaching, students achieved almost the same score compare to the control group which was assisted by faculty instructor. There were no significant differences in tasks related to either Catheterization or suturing.

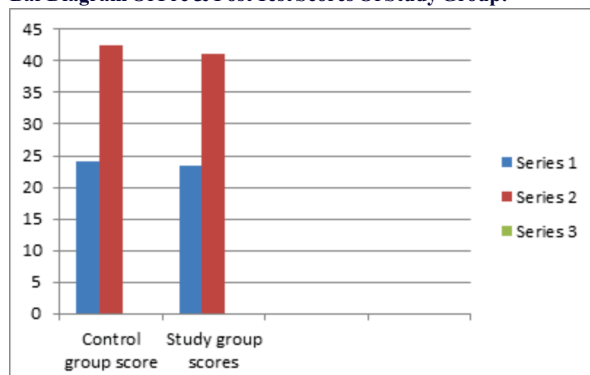
Based on the online feedback of students, although students positively assessed the presence of NPT tutors to train them and gave satisfaction feedback of 4.65 to NPT tutors while 4.75 to faculty instructors on a Likert scale of 5.



Bar Diagram Of Pre & Post Test Scores Of Control Group:



Bar Diagram Of Pre & Post Test Scores Of Study Group:



Bar Diagram Of Pre & Post Test Scores Of Study & Control Group:

DISCUSSION

In the course of our research, we assessed the effect of NPT on the development and satisfaction of students using an objective method among homogenous groups.

Main Hypothesis

We successfully proved our main hypothesis that the involvement of NPT in the teaching of basic surgical skills significantly improved exam result of the students.

In the reviewed literature, only Batchelder et al did not find the application of the NPT method effective in terms of student exam scores, although they also reported that students in the program felt more prepared and more familiar of the style of exam questions when there were NPT tutors [7].

In basic science, Gallan et al. (biochemistry), Jackson et al. (physiology), and Sawyer et al. (first-year compare to our results. They are consistent with our general findings that the application of NPT could improve students exam score [11].

In randomized controlled studies, Hudson and Tokin demonstrated that NPT tutors can be at least as effective in teaching history and physical examination skills as graduate doctors, as well as others in the field of resuscitation training, bladder catheterization and intravenous cannulation [8].

In the study by Preece et al., senior medical students delivered two suturing workshops to 35 students. They had significant improvement in the number of the completed number of sutures and inter-suture distance. All students found the work-shop helpful and the teaching environment relaxed. Furthermore, 87% of the students reported that the workshop increased their interest in a surgical career [10].

The effectiveness of the NPT method for teaching musculoskeletal competence has also been demonstrated with the involvement of orthopedic residents [6].

CONCLUSIONS:

NPT is effective method of teaching & learning when there is faculty shortage for training undergraduate medical students in basic surgical skills. This project helped in developing basic surgical skills in all the participant. All 100 students found it to be extremely useful & learner

oriented. DOPS scores & observational data showed statistically significant outcome. Interns who taught students used this experience to enhance their skills as educators. Faculty involved in this study felt need to continue NPT method to train undergraduates in basic surgical skills with addition of many more procedures in future.

In keeping with the current study that the teaching delivered by near-peer tutors was very well received by medical students. Students found that recent medical graduates provided a unique prospective to learn basic surgical skills & acquire confidence to achieve highest competency in basic skills. This study provides evidence that junior doctors as near-peer tutor can successfully & effectively train medical students to improve their basic surgical skills. We therefore support the use of junior doctors as near-peer tutors in variety of roles from teaching undergraduates to program development and organization.

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