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## **Improvement of surgical performance of medical students after basic surgical suturing workshops**

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### **Introduction**

Surgery, subject considered as one of the most demanding in medical education, fascinates medical students for centuries. And despite the possibilities of surgical observerships, as well as the passion and dreams of young adepts of medicine to acquire practical skills and experience in this fascinating field, we observe lack of practical aspect in medical undergraduate training. In order to allow medical students to experience basics of surgical reality, every year our team performs surgical suturing workshops for more than 50 students from all years within non-formal peer-to-peer education model.

## The Aim of the Study

The aim of this study is to present the effectiveness of basic suturing training among 145 international students of Medical University of Lublin.

## Materials and methods

The study group included 145 international students with no prior or little practical surgical experience, who attended surgical workshops in 15-participant groups in years 2014-2016. Both knowledge and technical performance were rated before and after conduction of the workshops.

## Results

Within theoretical part of the training, 84% increase of knowledge in surgical procedures was observed. As for the practical skills, 71% of attendees decreased time of basic and continuous sutures performance by at least 50%. Non-formal peer-to-peer education model, as well as small groups and sufficient time for practice were noted as essential factor to the significant results of conducted workshop.

## Conclusions

Basic surgical skills workshops serve as a great example of non-formal peer-to-peer training which improves practical abilities among attendees, as well as didactic and teamwork skills among senior students.

**Keywords MeSH: surgical skills, peer-to-peer training, medical education**

## **Introduction**

Surgery fascinates adepts of art of medicine for centuries. Starting from Ancient India and achievements of Sushruta, through the illegal bodies dissections by da Vinci and legal anatomy lessons of Dr Tulp, until the beginning of modern surgery with John Hunter works in 18<sup>th</sup> century, introduction of anaesthesia and modern surgical techniques in 19<sup>th</sup> century, surgery has been always considered as a technical profession. [1] Surgical skills have been taught firstly from understanding of anatomical structures with the centuries-long tradition of wax figures, afterwards exchanged with legal autopsies from 17<sup>th</sup> century and cadaveric simulations of surgeries. [2] The practical surgical skills for centuries had been obtained by residents directly by the operating tables or beds of the patients. Regardless of the additional core competencies added to the training in 20<sup>th</sup> century, such as communication skills, professionalism, evidence based knowledge, surgeon without adequate manual skills does not fit the criteria of a good surgeon. [3-5] In order to minimize patients suffering and occurrence of adverse events, in last 10 years new training techniques are constantly being invented, in order to provide realistic experience for future surgeons to cope with surgical challenges.

In modern surgery, two key considerations should be underlined - first, the importance of practical training performed both by residents and undergraduates. The undergraduate surgical training is one of the priorities of medical education worldwide, however only several countries are offering practical training (such as eg. United States, Great Britain, Hungary). In Poland, according to standards of teaching in medical professions within the regulation of the Minister of Science and Higher Education from 09/05/2012, as part of clinical surgical sciences, after completing medical studies, in terms of skills, the graduate should "use the basic surgical instruments and suture a simple wound". [6] For a practical study of surgery by syllabus, a maximum of 1 activity is devoted to the whole cycle of education. Second consideration, important in Polish settings, is surgery being a deficit specialization. According to data of Polish Surgeons Society from 2014, only 4000 surgeons work within public health care system. The average age of the surgeons is 55 years, more than 70% of surgeons are above 40 years old. It is hard to identify the proper reasons for this situation. [7]

That is why, in order to make surgery more appealing and understandable to the undergraduate students, as well as to prepare surgical enthusiasts to the future reality of their profession, give them a chance to test their surgical skills, the basic surgical suturing skills workshops in English have been conducted for students of Medical University of Lublin.

## **Aim of the study**

The aim of our study is to present the duality of effectiveness of peer-to-peer basic suturing training, with the beneficial teaching of the participants as well as the educators.

## **Materials and methods**

Study group consisted of 145 international medical students of Medical University of Lublin, attendees of basic surgical suturing training workshops in years 2014-2016.

Within 2 hours of training of 15 participants per workshop, students obtained theoretical and practical knowledge on basics of suturing from their peer educators. Peer trainers were the graduates of week training of Surgical Summerschools held both in Poland and abroad. Before the training, briefing meetings with an hour training session for the trainers were held, and revision materials of sutures taught provided by the coordinator. The sub-groups during the workshop counted 1 peer trainer - 5 participants, for better learning outcomes. The practical part of the workshops was being held firstly on sponges, in second part of workshop on pork skin and legs.

Knowledge on practical surgical information was measured with 15-questions test. Participants performed the test before the start of the course and in the end of the course. Additionally, respondents age, year of study, previous attendance to surgical procedures information was also obtained. Results then were divided depending on the type of question (general terminology, taking of sutures, specific type of suture). Additionally, the progress of the practical skills has been measured - the time spent on performing first and last: single simple interrupted suture, continuous non-locking suture, single vertical mattress suture.

## **Results**

Within our study group, students of faculty of medicine of all years took part in the questionnaire. Most of the students attended their 4th year of medicine (34,5%), 65,5%

women and 34,5% of men. The average age of the respondents was 23 years old. Participants of the workshops were chosen on basis: first come, first served within a google registration form. 56% of respondents claimed to start or already attended surgery course as part of their studies, and 21% stated that they received single surgical training during University course.

Within pre- and post-questionnaire regarding surgical procedures, up to 86% increase of knowledge was observed, depending on the type of question. The average score in pre-questionnaire (20%) increased up to 93% in post-questionnaire.

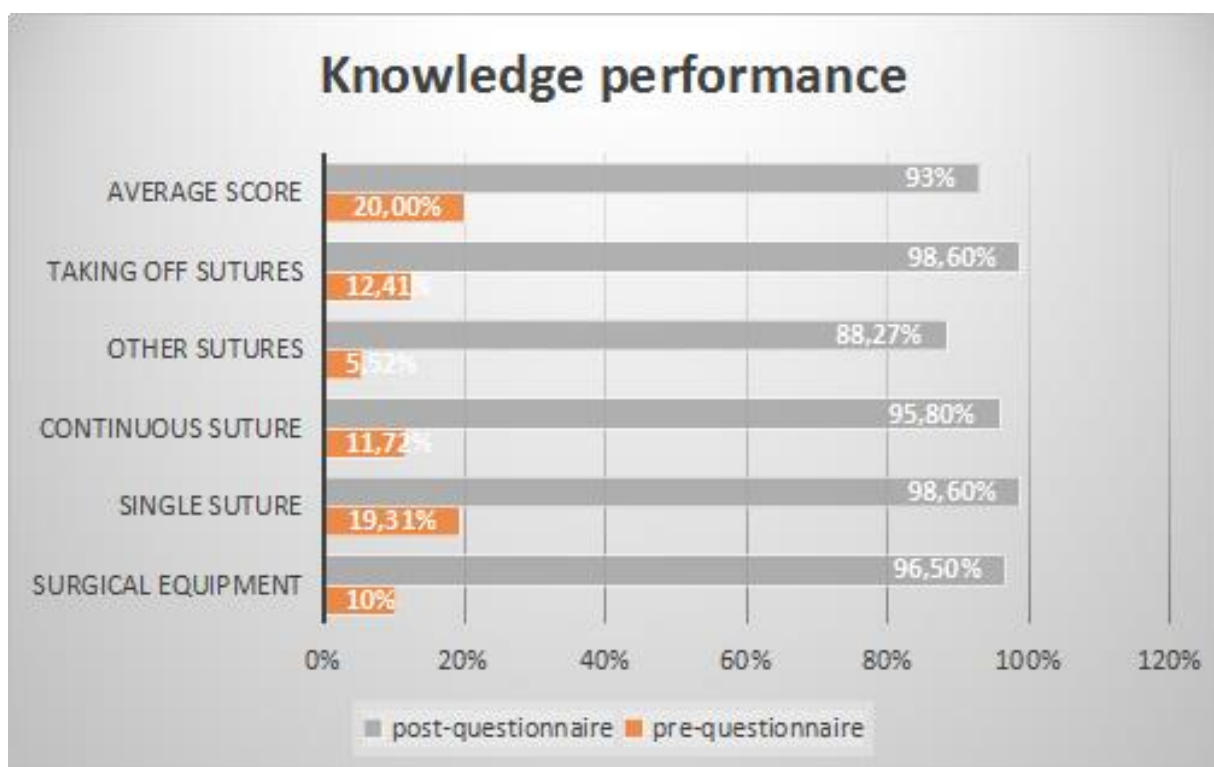


Table 1. Performance of correct answers depending on the type of question pre and post-questionnaire. Prepared by authors.

### Practical aspect performance

As for the technical performance, 71% of participants decreased their time of performing the basic and continuous sutures by at least 50%.

## Satisfaction aspects and importance of obtained skills

100% Satisfied with the workshops	100% participants
Would recommend this workshop to other peers	100% participants
Surgical skills are relevant to all kinds of specialties	59% participants
More confident with surgical equipment	98% participants
If asked, feel confident to perform the sutures learnt	71% participants

Table 2. Satisfaction of participants results. Prepared by authors.

Vast majority of participants felt more confident with surgical equipment and felt confident in performing surgical tasks. 71% feel confident to perform learnt sutures if asked by medical staff. However, only 59% agree that surgical skills are relevant to all medical professions.

## Team briefing

After every workshop, a team trainers briefing was held in order to feedback the trainers and receive the personal evaluations of each trainer. Peer educators confidence raised 75% in comparison to pre-training questionnaire. 100% of educators felt support in the group, 100% felt empowered to forward the knowledge on to peers and 100% felt their didactic skills significantly improved.

## Discussion

### Advantages of the method

Our method of teaching had several advantages, which authors would like to underline. Firstly, the small groups maximized the success rate of learning progress. Secondly, the amount of time (2 hours) was sufficient to learn basics of surgical skills and practice at least 5 different types of sutures at least 5 times. Presence of peers- educators was also important in conduction of the training, created a friendly atmosphere suitable for learning and making mistakes in the pursuit of surgical perfection. Also, the aspect of improvement of didactic skills of trainers hopefully increased surgical teaching morale, and inspired other students to take part in surgical medical education in the future.

### **Future of surgical training**

In modern medical education more and more classes are being held within medical simulation techniques. In surgical education, we can differentiate low-cost simulation, as presented in our study - the animal samples or laparoscopic training devices, and high-cost, such as hybrid trainers or virtual reality equipment. Both of the methods have the advantages and disadvantages - for low-cost simulation, despite the realism of the performed tasks, most of the considerations include the differences in anatomy of animals as well as ethics of such training when it comes to simulation of whole surgeries. In high-cost simulation - firstly, the high cost of equipment, secondly - importance of experts attendance during such training, while having limited human resources, are main reasons in favour of the low cost training. Taking into consideration the effectiveness of training, the differences between both is 1-2% in favor of high cost simulators. [8;9]

### **Conclusions**

Basic surgical skills is a great example of peer-to-peer training which supports not only the practical qualities improvement, but also the didactic skills and teamwork experience among future physicians. We believe that medical students should advocate for inclusion of surgical labs into medical curriculum, which is the lacking aspect in Polish surgical training.

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