



## EFFICIENCY OF TRAINING COURSES IN LAPAROSCOPIC SURGERY FOR MEDICAL STUDENTS

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### SUMMARY:

**Purpose:** In recent decades, laparoscopic surgery (LS) has become a standard in the treatment of many diseases and is increasingly preferred by patients, therefore the need for specific training. In Bulgaria, there is a lack of regular real-time minimally invasive surgery training for students and young doctors specializing in surgical specialties.

**Aim:** Our aim is to evaluate the influence and efficiency of extra-curricular laparoscopic surgery courses organized at Medical University of Pleven, Bulgaria and the need for similar courses in medical students' training.

**Methods:** Anonymous poll in Google forms was sent at least 1 year after the completion of the training course to all of the 60 participants in the courses from 2013 to 2016.

**Results:** 43% of respondents have become surgical residents at the time they answered the poll. 56% responded that their participation in the training course helped them in the choice of speciality. 72% of respondents believe that after completing the training course, they felt more confident during laparoscopic surgery. According to 65.2%, the learning objectives have been fully achieved.

**Conclusions:** Starting the LS learning curve in medical school through an additional course is an effective and necessary approach for the rapid and harmonious growth of young surgeons.

**Keywords:** laparoscopy, training, learning curve, medical students,

### INTRODUCTION:

In recent decades, laparoscopic surgery (LS) has become a standard in the treatment of many diseases and is increasingly preferred by patients [1-4]. Many studies show the feasibility and safety of this approach and its superiority regarding postoperative pain, length of hospital stay, intraoperative blood loss, cosmetic effect and quality of life [5]. The wide application of this technique leads to the need for a specific training. Thanks to simulation models and virtual simulators, laparoscopic surgery can be trained outside of the operating room. This avoids the training of young surgeons on patients and provides maximum safety for patients combined with high-quality procedures [6-9]. Recent trend in medical education is speeding up the learning process through basics set in the student years of future surgeons. Nowadays, training on box trainers, cadavers, anaesthetized animals, virtual 2D and 3D monitors, as well as employing virtual reality are being used. The results are directly related to the way of teaching and the presence of mentors, which impose some limitations. A new way to solve this problem is the use of telemedicine [10, 11]. In Bulgaria, there is a lack of regular real-time minimally invasive surgery training for students and young doctors specializing in surgical specialties. Only specialized courses are offered, which are not compulsory in modular training.

Our aim is to evaluate the influence and efficiency of extra-curricular laparoscopic surgery courses for medical students focusing on the learning curve of young doctors and evaluate the need for similar courses in medical students' training.

**MATERIALS AND METHODS:**

For the period from 2013 to 2016, several LS courses for Bulgarian and English speaking students were organized at the Medical University-Pleven. A total of 60 students from 4th to 6th grade of all the medical universities in the country took part in consecutive editions of the course. The total duration of the courses was two days. On the first day there were theory on laparoscopic surgery and live surgery. The theoretical part was divided in general part, including the basics of laparoscopic surgery, and specialized part, including the most frequent laparoscopic interventions in abdominal surgery. Experienced lecturers from all over the country took part. On the second day - practical exercises on virtual and box trainers. The following exercises with an increasing level of difficulty, suitable for beginner surgeons, were used:

“Put the tablet” - participants must grab a tablet with a laparoscopic grasper and place it in a specific spot.

“Choose and place” - participants need to place different sized objects in their matching holes.

“Through the rings” - participants need to pass a

needle through metal rings oriented in different directions.

“Hang the rubber band” - the participants need to stretch a rubber band to a certain level and attach it between two hooks.

“Sewing” - Participants need to sew an object needle and thread at a specific place.

“Bind knots” - participants need to perform an intracorporal knot.

Tasks develop eye-to-hand coordination in 2D, hands coordination, spatial orientation, fine motor movements, dominant and non-dominant hand use, and more. Because of the great interest, the students were selected after preliminary selection, taking into account the general success of the student, interest in laparoscopic surgery, academic achievements and motivation to participate. The effectiveness and influence of the course were evaluated through anonymous polls in Google forms sent at least 1 year after the completion of the training course, including 17 questions completed by the participants after a different time period from the end of the course (Table 1)

**Table 1.** The questionnaire that was given to all the participants

Sex	<input type="checkbox"/> Man <input type="checkbox"/> Woman
What speciality do you specialize in?	<input type="checkbox"/> Surgical <input type="checkbox"/> Non-Surgical <input type="checkbox"/> I graduated, but I do not specialize <input type="checkbox"/> I'm still a student
Did the “laparoscopic and robotic surgery school for students” at the MU-Pleven help you choose your current speciality?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Which module do you think is more useful in the course?	<input type="checkbox"/> Box Trainer <input type="checkbox"/> Virtual simulator <input type="checkbox"/> Both <input type="checkbox"/> Neither
From your current point of view, do you think the laparoscopic school was useful to you?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Did the training take place at an comprehensible level?	<input type="checkbox"/> From 1-poor to-5-excellent
Was the practical part enough?	<input type="checkbox"/> From 1-poor to-5-excellent
How do you evaluate the quality of the organization and the training?	<input type="checkbox"/> From 1-poor to-5-excellent
How do you assess the quality of teaching in the theoretical part?	<input type="checkbox"/> From 1-poor to-5-excellent
How do you assess the quality of teaching in the practical part?	<input type="checkbox"/> From 1-poor to-5-excellent
Have the learning objectives been achieved as you expected?	<input type="checkbox"/> From 1-poor to-5-excellent

Do laparoscopic operations take place in the place where you work?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> I still do not work
Did you participate in laparoscopic surgery?	<input type="checkbox"/> Yes <input type="checkbox"/> No
What was your position in laparoscopic surgery?	<input type="checkbox"/> Cameraman <input type="checkbox"/> 1st assistant <input type="checkbox"/> I have not been involved
How would you rate your participation in your first laparoscopic surgery?	<input type="checkbox"/> From 1-poor to-5-excellent
To what extent you felt sure in your first laparoscopic surgery?	<input type="checkbox"/> From 1-poor to-5-excellent
To what extent you are familiar with the instruments used in laparoscopic surgery?	<input type="checkbox"/> From 1-poor to-5-excellent

**RESULTS:**

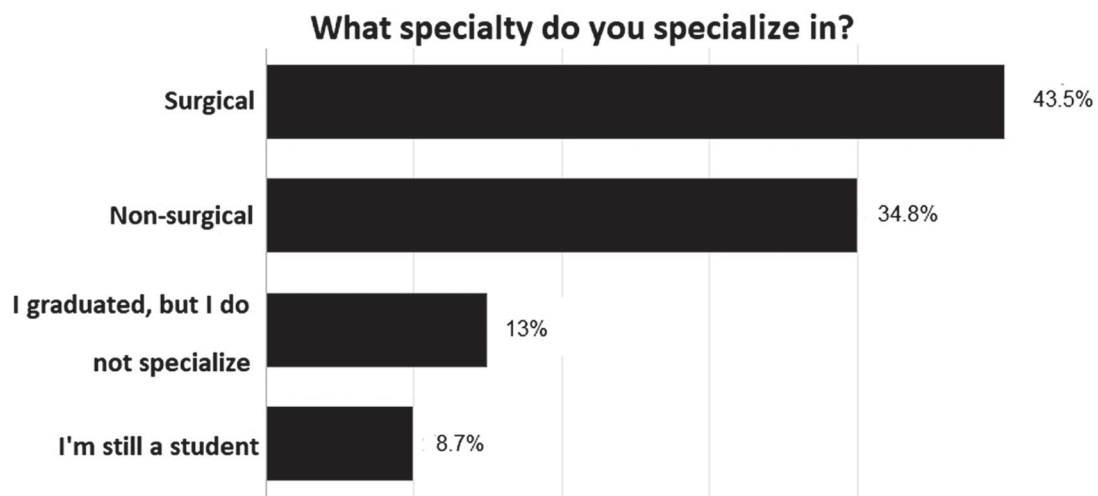
During the study period, 60 students took part in the training courses. Fifty five of them (91.7%) completed an anonymous poll sent to their emails. Divided by gender 52% are men and 48% women.

According to their answers 43% of respondents, at the time they answered the poll, were surgical residents (Fig.1), 56% responded that their participation in the training course helped them in the choice of speciality (Fig.2).

We found that 47.8% of participants work in departments where laparoscopic operations are performed and 69.6% were involved in laparoscopic operations. A total of 72.2% responded with “very good” or “excellent” about

whether they felt safe in their first laparoscopic operations (Fig.3). According to them 88.9% had very good or excellent knowledge of the instruments in their first participation in laparoscopic surgery. After completing the training course 72% of respondents believe that they felt more confident during laparoscopic surgery, and 87% feel that their participation in the courses has been beneficial to them. To the question “Did the training take place at an comprehensible level?” 95.7% responded with “very good” or “excellent”. The majority of them believe that both modules in the practical training were equally useful (60.9%). According to 65.2%, the learning objectives have been fully achieved.

**Fig. 1.** What speciality do you specialize in?



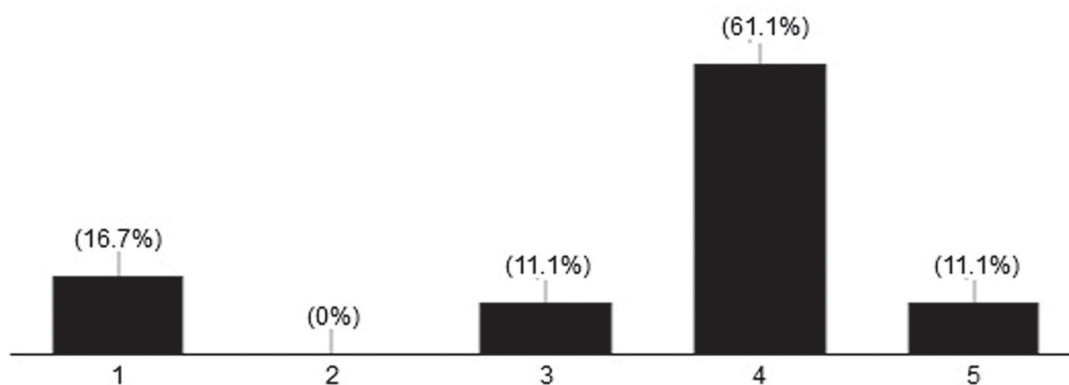
**Fig. 2.** Did the “laparoscopic and robotic surgery school for students” at the MU-Pleven help you choose your current specialty?

### Did the “laparoscopic and robotic surgery school for students” at MU-Pleven help you choose your current specialty?



**Fig. 3.** To what extent you felt sure in your first laparoscopic surgery?

### To what extent you felt sure in your first laparoscopic surgery?



#### DISCUSSION:

The harmonious development of modern surgeons is a combination of mastering conventional surgery, along with all the achievements of LS. This requires a proper learning approach that provides a gradual learning curve for young doctors. Nowadays, there is a consensus among experts that young surgeons can learn basic laparoscopic skills using simulators and computer-based virtual simulators that allow them to advance in the initial part of their learning curve [12, 13]. Among the advantages of simulation in surgical training are the possibility of mistaking without consequences for the patient and the possibility of “learning from your mistakes”. However, feedback from a supervisor is needed to achieve better results and avoid learning the wrong models [14-16]. Studies have shown that the basic laparoscopic knowledge and skills of young surgeons have improved over time, possibly due to increased

number of laparoscopic interventions, increased use of simulators by students and increased exposure of students to laparoscopic surgeries [17, 18]. Studies show that using video game consoles can improve laparoscopic skills [19, 20]. Our results show that 72% felt confident and prepared for LS following their participation in the training courses, and the majority of participants felt that this course had been useful to them and they were satisfied with it.

#### CONCLUSION:

Starting the LS learning curve in medical school through an additional course is an effective and necessary approach for the rapid and harmonious growth of young surgeons. It is necessary to introduce a LS class in regular medical education for those students who are interested in surgery.

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