



ПРОФЕСІЙНА ОСВІТА

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How the students' scientific activity and practical skills training effect on their learning of traumatology and orthopedics

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***Abstract.** During the last years the state of education in the country was significantly diminished that cause the urgent necessity to search for improvements, particularly for traumatology and orthopaedic, as the rate of civil and war injuries have been increased significantly. Among the variety of well-known factors that are effecting the learning process we chose scientific and practical skills training activities, as not so much information is found in the available Ukrainian and foreign literature.*

***Objective** of the study was to analyze how the different types of additional scientific and practical students' activity effect on the educational process in traumatology and orthopedics.*

***Methods.** We assessed the positive effect of additional scientific activity on the students' education according to 5 point system by analyzing their scores before and after they had been involved in it. During last 10 years there were 17 students (11 foreign and 6 Ukrainian) on the Traumatology and Orthopedics department that*



prepared 21 publications (8 articles and 13 reports on scientific conferences with abstracts publication).

Results. *The average students' score for first 4 classes was 4.58 and for the last 4 classes it was 4.83. That indicates the positive effect of scientific activity on the student educations on Traumatology and Orthopedics, as students were making the research on the topics that they studied on the classes, but on the more deep level. Students were analyzing scientific papers on the subject of their research and they saw the practical application of their theoretical knowledge that had helped to develop clinically oriented way of thinking and inspired on further studying.*

Conclusions. *The study showed that adding scientific activity additionally to the approved educational program is boosting educational process for medical students during Traumatology and Orthopaedics practical classes, seminars and lectures. The similar effect we noticed for students which were taking part in practical skills trainings. Both for teachers and students such activity requires more time and efforts, so it can't be used for students with low learning motivation.*

Key words: *scientific activity, learning process, education quality, traumatology, orthopaedics, professional skills.*

Залучення студентів до наукової роботи та практично-орієнтованих тренінгів та їх вплив на навчальний процес з травматології та ортопедії

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Анотація. *Впродовж останніх років рівень освіти в країні значно*



погіршився, що потребує негайного пошуку шляхів до його покращення. Особливо це стосується травматології та ортопедії, враховуючи, що рівень цивільних та військових травм значно виріс. Серед значної кількості відомих факторів, що впливають на навчальний процес ми вибрали наукову роботу та тренінги з відпрацювання практичних навичок. Інформація з цього питання недостатньо висвітлена в періодичній літературі.

Метою дослідження було проаналізувати, як впливає на навчальний процес з травматології та ортопедії додаткова наукова та практична активність студентів.

Методи. Була проведена оцінка позитивного ефекту додаткової наукової діяльності на навчальний процес студентів за 5 бальною шкалою, шляхом аналізу їх середнього балу до та після того, як вони були задіяні до наукової роботи. Впродовж останніх 10 років на кафедрі травматології та ортопедії було задіяно до наукової роботи 17 студентів (11 іноземних та 6 українських). Всього було опубліковано 21 робота (8 статей та 13 тез наукових конференцій).

Результати. Впродовж перших 4 занять, до того як студенти були задіяні до наукової роботи, середній бал складав 4,58, а після цього, за останні 4 заняття - 4,83. Це вказує на позитивний ефект на навчальний процес з травматології та ортопедії наукової роботи студентів. Оскільки студенти проводять дослідження з тем, які вони вивчають впродовж практичних занять, але на більш глибокому рівні. Студенти проводять аналіз наукових публікацій по темі дослідження і також вони бачать результати практичного застосування в клінічній практиці теоретичних знань, які вони отримали під час навчання. Це сприяє розвитку клінічного мислення та надихає на подальше навчання.

Висновки. Було досліджено, що наукова діяльність, що проводиться додатково до затвердженої навчальної програми, значно покращує навчальний процес під час практичних і семінарських занять та лекцій з травматології та



ортопедії у медичних студентів. Схожий ефект було відмічено і для студентів, які приймали участь у тренінгах з практичних навичок по травматології та ортопедії. Звичайно це вимагає додаткових зусиль та часу, як з боку викладача, так і студента. Також слід зазначити, що у студентів з низькою мотивацією до навчання, цей підхід навряд чи може бути успішним.

***Ключові слова:** наукова робота, навчальний процес, якість освіти, травматологія, ортопедія, професійні навички.*

Actuality. Due to the COVID-19 period and the war related issues the education in Ukraine is facing many challenges, and most of them have negative effect on students' level of knowledge and their study motivations [1]. The global pandemic have changed the curriculum to mostly online studying and small discussion groups, and all educational materials was reviewed and adjusted for easy on-line use either in synchronic or asynchronic mode [2]. The war time in Ukraine caused the decreased funding of the universities, the loss of professors, the destruction of the Universities' infrastructure, the lower amount of Ukrainian and foreign students have general negative effect on high schools' education [3]. Electricity cut outs, problems with transport, often and continuous alarms leave less time for studying and has negative psychological effect not only on students, but on the University staff too, requiring more attention for mental health and motivation [4]. Therefore any attempts to improve students' education process on traumatology and orthopedics are welcome at our department, and if the positive effect of these measures is significant they are organized and held on the regular basis.

Analysis of recent research and publications. There were several studies performed to determine the importance of different factors on educational process of medical students [5, 6, 8]. It was revealed such factors as students' motivation [9], implementation of virtual patients in medical curriculum [10], creating educational



videos [11], use of virtual reality for practical skills training [12], use of simulation game to motivate students and develop their clinical cognitive skills [13], three-dimensional Visualization Software to improve Spatial Intelligence in Students learning of anatomy [14]. The last one was practically introduced several years ago by AO (Arbeitsgemeinschaft für Osteosynthesefragen) Foundation, as a part of educational website and is accessible by medical pre- graduated and post-graduated students, orthopaedics and trauma surgeons to plan surgeries and fracture reductions. Some of the suggested measures to improve education of medical students are quite unusual and extraordinary: internal branding with developing students' sense of belonging and their behavioral intention to become active member of university alumni associations [15], playing classical music on background during anatomy classes, to improve students' spatial abilities [16] which is important for orthopaedics and traumatological surgeons, and even additional video gaming activity using Tetris can serve for this purpose, as it was studied by Labranche et al in 2014 [17].

Highlighting previously unresolved parts of the overall problem. So most of the researchers are going on with conclusion that students' motivation is the key factor in educational process, but there is no exact guidelines how to increase it on the regular basis. Kusrkar et al. in 2011 came into conclusion that motivation level depends on the factors that can't be manipulated by medical educators, as age, gender, ethnicity, socioeconomic status, personality, year of medical curriculum and teacher and peer support. Other factors can be successfully influenced, as the autonomy, competence and relatedness, which have been described, as the basic psychological needs important for intrinsic motivation according to Self-determination Theory [18]. There is also the negative effect for medical students' education of chronic stress, particularly during assessment period [19]. So as the many factors effecting motivation were found, there were no comparing studies among them, and the value of each factor remains unknown.



Also such factors, as scientific activity or involvement students in workshops and practical skills training were not studied before.

Formulation of the goals of the article. Most of the teachers in daily practice are focused on the level of knowledge that is not exceeding educational program. That is generally accepted optimal way of teaching, so the involvement students in additional scientific activity or practical skills training is ignored. But in our opinion the expanding students horizon on the discipline has a stimulative effect on students learning and for some of them helps to chose «Traumatology and orthopaedic» as their future specialty. So, in our study we decided to reveal the relation between the quality of the learning process and such factors, as scientific activity, involvement students in practical workshops on some basic orthopaedic techniques, membership in students Orthopaedic society of our University department. The data about this topic is poorly presented in the literature [20, 21].

The aim of our study was to analyze how the different types of additional students' activity effect on the educational process in traumatology and orthopedics.

Methods. We tried to assess the positive effect of additional scientific activity on the students' education by analyzing their scores before and after they had been involved into it. During last 10 years there were 17 students (11 foreign and 6 Ukrainian) on the Traumatology and Orthopedics department that prepared 21 publications (8 articles and 13 reports on scientific conferences with abstracts publication). 23 students at the present time are members of the scientific society at Traumatology and Orthopaedics department (Table 1). There were 4 classes held before the time-point when students started their scientific activity and 4 classes after. The average everyday activity score of those two periods were compared.

Results and discussions. In our University students are studying the «Traumatology and orthopedics» Module on fifth year during 90 educational hours (ten of those are lectures, 40 hours are practical classes, 40 hours are for students self-



education). This regular activity provides students with theoretical and practical skills according to the approved educational program, but there is also additional activity that includes participation in workshops, conferences, preparing articles, attending evening and night shifts in the hospital, patients' curation. The clinical work is very common for medical students, but students' scientific activity is an additional option for just few students and attending practical workshops, conferences as well. For such activity students that have the highest scores on Traumatology and Orthopaedics and other subjects are usually involved. There are many benefits from such activity - it is accounted for students rating, it gives the opportunity for students to get additional knowledge and skills during scientific activity.

Table 1.

Students distribution according to the activity which is additional to educational program

Total number of students in the scientific society at Traumatology and Orthopaedics department	Students involved in scientific activity		Total number of publications		Oral reports	Students involved in practical skills training
	17		21			
	Ukrainian	Foreign	Articles	Abstracts	8	
23	6	11	8	13		28

Students' level of knowledge was assessed according to 5 point system. The average students' score for first 4 classes was 4.58 and for the last 4 classes it was 4.83 (Fig. 1). Comparing with average score of 5th year students after final module is 4.02 (Ukrainian and foreign students together, n=386). There were 3 practical trainings held during last four years – «Internal fixation of fractures with metal and polymeric screws», «Osteosynthesis fractures with plates and screws», «Treatment of open and gun-shot fractures with external fixators». Among the students of 5th year involved in



the practical skills training the average score was 4.27. That indicates the positive effect of scientific activity and participation in practical skills training on the students' education on Traumatology and Orthopedics. It can be explained in several ways. Students were making the research on the topics that they studied on the classes, but on the more deep level. Students were analyzing scientific papers on the subject of their research and they saw the practical application of their theoretical knowledge that had helped them to develop clinically oriented way of thinking and inspired on further studying.

Conclusion. The study showed that adding scientific activity additionally to the approved educational program is boosting educational process for medical students during practical classes, seminars and lectures. The similar effect we noticed for students taking part in practical skills training. Both for teachers and students such activity requires more time and efforts, so it can't be used for students with low learning motivation.

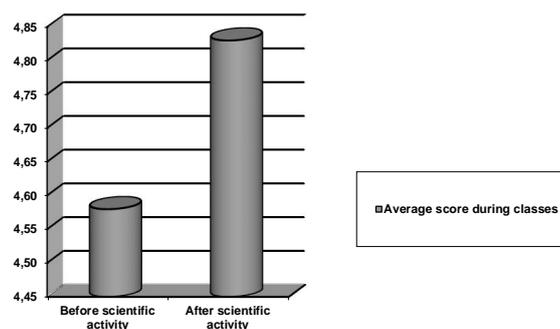


Fig. 1. Changes of students' everyday activity scores after they were involved into scientific activity

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