



Effect of Video Games Playing on Surgical Simulation Training: a Systematic Review

Petar Dimov¹, Jennie Hurtig², Konstantinos Georgiou³, Dimitrios Theodorou³, Blagoi Marinov^{1,4}, Lars Enochsson²

¹ Department of Pathophysiology, Medical University of Plovdiv, Plovdiv, Bulgaria

² Department of Surgical and Perioperative Sciences, Umeå University, Luleå, Sweden.

³ First Department of Propaedeutic Surgery, Hippokration General Hospital of Athens, Athens Medical School, National and Kapodistrian University of Athens, Athens, Greece.

⁴ Medical Simulation Training Center at Research Institute of Medical University of Plovdiv, Plovdiv, Bulgaria.

Corresponding author: Petar Dimov, Department of Pathophysiology, Medical University of Plovdiv, 15A Vassil Aprilov Blvd., 4002 Plovdiv, Bulgaria; E-mail: pdimov@pathophysiology.info; Tel.: +359 887 791 086

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Abstract

Introduction: Video games have a positive impact on the skills required for laparoscopic surgery. Several studies have assessed the impact of video games on laparoscopic skills.

Aim: This study aims to systematically review the existing evidence.

Materials and methods: A search strategy was implemented to retrieve relevant articles from MEDLINE and SCOPUS databases. The retrieved articles were reviewed for further evaluation according to the predetermined inclusion/exclusion criteria.

Results: Twenty-six studies were included in this systematic review. These included prospective (n=9), retrospective (n=5) and interventional (n=12). Other review papers were cited in the discussion section. Studies with positive outcomes significantly outweighed the negative ones (21 vs. 5, respectively).

Conclusions: Although there is some evidence that video game experience could give some advantage in laparoscopy no firm conclusions could be drawn yet. The reasons for that lay in the various aims, approaches and results of different study reports. Gaming could be used as a daily warm-up or as a tool to speed-up mastering new skills. A standardized protocol is needed for answering the different questions regarding the impact of video game exposure to laparoscopic skills development and progression.

Keywords

laparoscopic skills, minimal invasive surgery

INTRODUCTION

Patients' safety requirements have led to train health care staff in simulated settings in order to reduce cost and patient morbidity and mortality. Technological applica-

tions of virtual reality, simulation, and e-learning have resulted in improved learning metrics, and they are already integrated in laparoscopic surgical training.¹⁻³

At the same time, there is evidence that video games increase visuospatial attention and spatial resolution^{4,5},

while they enhance the hand-eye coordination.⁶ Several studies have assessed the impact of video games (VG) on laparoscopic skills and suggested that video games could be means for surgical training. The sought applications of VG vary considerably, hence the results are different. Still, the fact that some game manufacturers have invested in creating “serious” games – that is, games played on commercially available platforms purposefully designed to train specific skills is indicative enough. This article intends to systematically review studies that evaluate the impact of video games on laparoscopic skills.

MATERIALS AND METHODS

This systematic review was conducted by searching medical literature in MEDLINE and SCOPUS, guided by the PRISMA protocol.^{7,8} The last search was conducted in April 2020. All retrieved article titles and abstracts were screened for relevant manuscripts. The next step was a full text review of the selected relevant articles in order to identify the studies suitable for inclusion in this systematic review.

Relevant full text review manuscripts or systematic review manuscripts were not included in the study; however, they were used to retrieve suitable articles from their reference list and add them to this systematic review.

Inclusion and exclusion criteria

Of the articles retrieved, using the above-described search strategy, we included in this systematic review only those articles that met the following criteria:

- Studies involving surgeons and/or surgical trainees, and/or residents, and/or fellows of any surgical subspecialty. Also, we included studies that were conducted using students as subjects, while those using nurses as subjects were excluded.
- Studies focused on performance during surgical operation and/or surgical simulation setting were included. Studies on non-surgical related interventions were excluded.

The included studies investigated the effects of commercially available games (both in terms of hardware and software). Studies involving only the so called “serious games” were excluded.

The search yielded 81 articles. Two of the authors (K.G. and L.E.) independently screened the abstracts of the retrieved articles that were assessed as meeting the inclusion criteria, and any differences were resolved by discussion. Forty-six articles were found suitable for further examination. Thereafter, a full text review of those articles was carried out. Finally, a total of 26 articles fulfilling all of the above criteria, were included in the review (**Fig. 1**).

Regarding the main purpose of the studies, they were divided into three different groups – prospective (9 studies), retrospective (5 studies) and interventional (12 studies).

RESULTS

The included studies could be divided in several different groups:

Prospective studies (Table 1)

These studies aimed at predicting future potential of developing laparoscopic skills by experience and/or current proficiency in video gaming.

In one of the early studies, Shane et al.⁹ compared fourth-year medical students with first-year surgical residents on a virtual reality (VR) simulator and found out that “gamers” (described as having more than 3 hours per week of VG playing) acquired new skills faster than non-gamers. Interestingly, the initial apprenticeship of the gamers was lower which may be due to the overconfidence of that group dealing with something seemingly familiar, while in the other group the participants were highly concentrated from the start.

In two studies (Boyd et al.¹⁰, Moglia et al.¹¹), in addition to video games exposure, the ability to play a musical instrument was also assessed. The skills and dexterity needed for this artistic activity seemed to benefit laparoscopic performance.

Salkini et al.¹² also report that among medical students naive to surgery and surgical simulation, expert video game players performed different tasks on the Simbionix Lab Mentor II faster and with less overall movement as compared to their non-playing counterparts.

In another study, among 38 medical students inexperienced in surgery, Kennedy et al.¹³ found that regular exposure to VG (minimum of 7 hours per week) turned out to be related to significantly better psychomotor skills, although not affecting visuospatial and perceptual capabilities – all of which were tested using a VR laparoscopic surgery simulator.

Besides medical students and residents, a couple of prospective studies were targeted at teenagers (Fanning et al.¹⁴) or even at younger children (Rosenthal et al.¹⁵). Both studies reported a beneficial effect of playing video games.

However, there is no uniform assumption that video gaming has a beneficial effect on potential laparoscopic skills.

Rosenberg et al.¹⁶ tested 11 medical students by having them play 3 commercially available games. After that, all students performed four laparoscopic tasks on a porcine model. There was a weak correlation between the performance in the VGs and in the laparoscopic tasks which was not significant. Then, the students were divided into a control group and a training group which had to play video games every day for 2 weeks. On the subsequent retest there were no differences between the “training” and the control group.

Madan et al.¹⁷ tested a group of 51 students in a box trainer or a virtual reality trainer. All participants filled in a questionnaire reporting their experience with computer

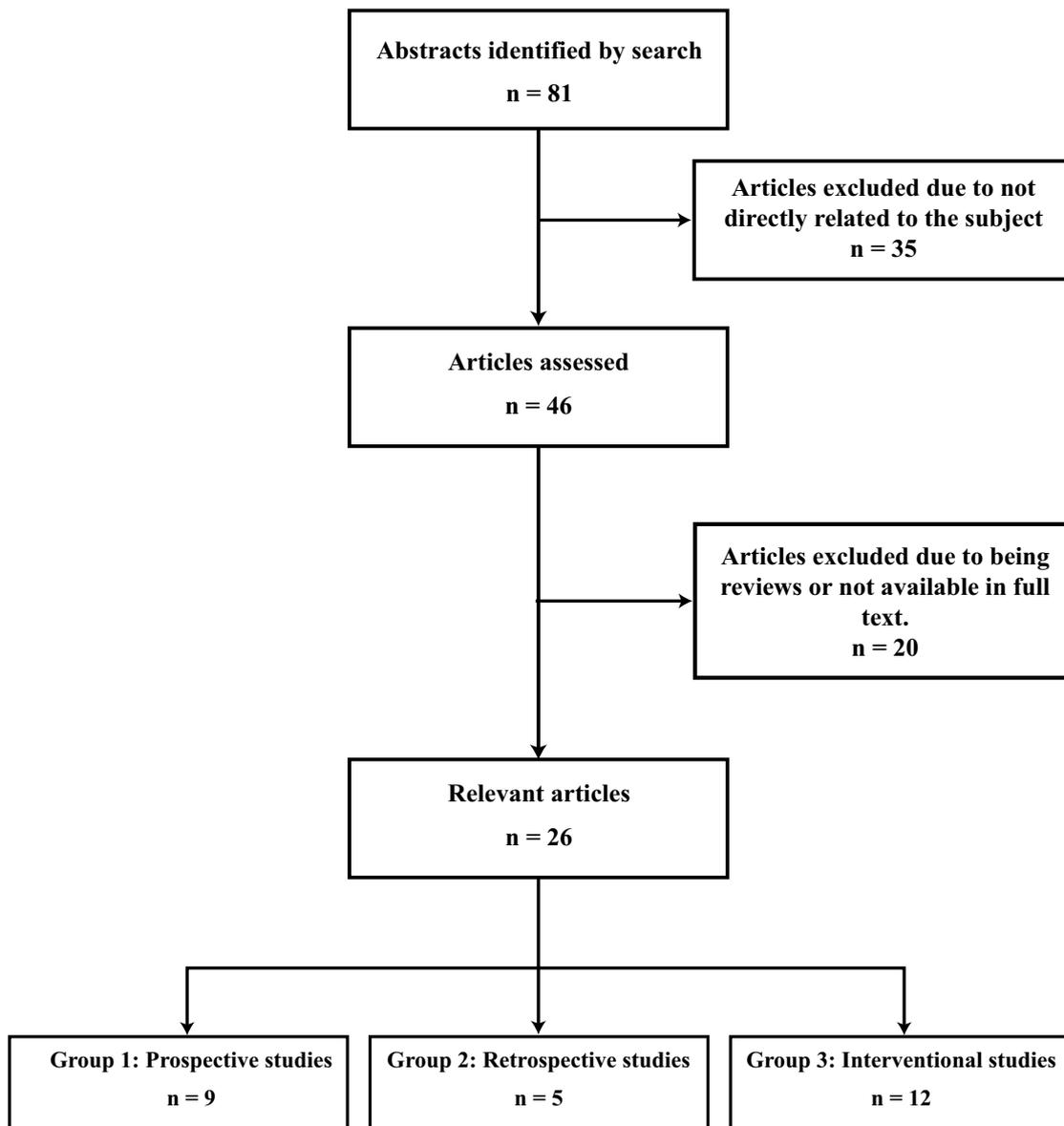


Figure 1. PRISMA flow diagram.

games, playing musical instruments, using chopsticks and few other dexterous activities. Even though the students with pre-existing non-surgical skills performed slightly better on the surgical trainers, there was no statistical significance.

Furthermore, except for the studies which find no significant correlation between video games exposure and laparoscopic skills, the study of Harper et al.¹⁸ found a negative effect of prior gaming.

In another study by Halvorsen et al.¹⁹, 48 high school students were recruited to perform two tasks on a virtual reality surgical simulator (SurgicalSim Education Platform – SEM). Their VG experience was assessed by self-reported questionnaires taking into account current and past regularity of video game playing. No association was found between VG exposure and baseline surgical simulator

scores, suggesting that gaming per se could not be a reliable predictor for surgical skills. Similar results were obtained by Moglia et al.²⁰ with 121 medical students who were tested on a Da Vinci Skill Simulator as exposure to video games did not seem to affect the performance on the surgical simulator.

Retrospective studies (Table 2)

In these studies, the subjects were surgeons with some prior experience in surgery and their VG exposure in the past was taken into account when assessing their current skills. Some of the studies focus not only on already acquired skill level but also on the speed and ease of learning.

One of the first studies assessing this issue was performed by Grantcharov et al.²¹ in 2003 among 25 surgical residents

Table 1. Summary of the prospective studies

Authors	Participants	Game experience	Simulator(s)	Conclusions
Shane et al. ⁹	4th-year medical students (n=11) and 1st-year surgical residents (n=15)	Gamers reported an average of 4.5 h/w videogame playing	Two tasks on MIST-VR	Positive. "Surgical novices with VGE acquire new surgical skills faster than those without"
Boyd T et al. ¹⁰	30 1st- and 2nd-year medical students, 18 males	Self-reported in 3 categories: None, some in the past and presently playing	Not clear, laparoscopic sutures done but not the device used	Positive, but vague - video game exposure does not significantly increase the laparoscopic skills
Moglia et al. ¹¹	57 med students divided in 4 groups (playing musical instruments, or VG, or both, or none)	9 people playing currently and 15 playing both VG & an instrument. About 8 years of VG experience	VR trainer for RAS (da Vinci) dV-Trainer simulator	Positive: correlations not statistically significant
Salkini et al. ¹²	Laparoscopically novice medical students (n=20) randomized into 2 groups (with haptic feedback (HFB) or without)	Self-reported questionnaire Participants who played VG regularly (n= 8)	3 tasks on Lap Mentor II repeated 5 times	Positive. "Demonstrate the effect of adding HFB on lap novices' performance when using the Lap Mentor 2". VG-players performed better
Kennedy et al. ¹³	Undergraduate medical students (n=38)	7 h/w in 3 of the last 5 years	Psychomotor ability was measured using ProMIS (VR)	Positive. "Experience playing VG will predict psychomotor performance on a lap simulator or scores on tests of visuospatial and perceptual abilities"
Fanning et al. ¹⁴	Teenagers (n=15) and Ob/Gyn residents (n= 15)	Teenagers with at least 5 years of experience of VG. Residents without any VG experience	Self-developed, validated box trainer	Positive. "Compare performance of teenaged gamers vs. residents without VGE"
Rosenthal et al. ¹⁵	Children (n= 32) Residents (n= 20) Surgeons (n= 14)	Self-reported questionnaire (age, gender, VG-experience, hand dominance) Children divided into high (n= 23) and low (n= 9) VG experience	2 conventional tests and 1 task on the Mentice SA Simulator	Positive. "Comparing laparoscopic VR task performance of children with different levels of experience in VG and residents". Children with high VG-experience perform better than those with low VG experience.
Rosenberg et al. ¹⁶	Medical students (n= 11). Group A -Control (n= 6). Group B-gamers (n= 5)	Two weeks of elective playing VG for students in group B (Average 6,2 hrs)	Four laparoscopic tasks in porcine model	Negative. "Is there a correlation between VG-skills and laparoscopic skills"
Madan et al. ¹⁷	Preclinical medical students (n= 51) VR group (n= 18) BT-group (n= 33)	Assessed by a self-reported survey, but not reported	5 tasks for the BT- group One task (acquire-and-place) on the MIST-VR for the VR-group. Chosen metric: Time and error.	Negative. "Assess the impact of certain pre-existing nonsurgical skills on baseline laparoscopic skills in both a box-trainer (BT) and VR-trainer"
Harper et al. ¹⁸	Preclinical medical students (n= 242)	Self-reported questionnaire. Students (n=10) with most VG-experience had a mean playing time of 15.136 total hours	5 minutes of tying knots in the Da Vinci surgical robot.	Negative. "To determine whether prior VGE enhances the acquisition of robotic surgical skills"
Halvorsen et al. ¹⁹	High school students (n= 48)	43 students played VG during the previous year. 41 students played VG 3 years ago, 5 students did not play VG the previous year 2 students did not play VG for 3 yrs.	2 repetitions of 2 tasks on SurgicalSim Education Platform (SEM) ("Gall-bladder dissection", "traverse tube")	Negative. "Examine the possible association between previous and present VG-playing and baseline performance on a VR laparoscopic performance". Almost no "non gamers"
Moglia et al. ²⁰	Medical students (n= 121) Expert surgeons (n= 4)	Little or no experience (n= 56), < 10-year experience (n= 28), > 10-year experience (n= 37)	Six tasks in the Da Vinci Skills Simulator (26 exercises performed and six tasks were chosen)	Negative. "Are there innate attributes for surgery normally distributed amongst the medical student population from which surgical trainees are ultimately selected"

VG: video games; VGE: video game experience

Table 2. Summary of the retrospective studies

Authors / Year	Participants	Game experience	Simulator(s)	Comments
Grantcharov et al. ²¹	Surgical residents (n=25)	Not reported	10 repetitions of six tasks on MIST-VR during one month	Positive. "Identify factors that influence surgeon's performance as measured by a VR computer simulator for laparoscopic surgery"
Rosser et al. ²²	Residents (n=21) Attending physicians (n=12)	25 minutes playing 3 different video games. Surgeons with VGE (n=19): Daily players (n=10). Mean playing time 8 years	Four tasks performed on Top Gun laparoscopic Skills and Suturing Program	Positive. "There is a potential link between video game play and laparoscopic surgical skill and suturing"
Lehmann et al. ²³	Total (n=105) Residents (n=74) Fellows (n=30)	16.2 % (n=17) were gamers, 80% (n=84) were experienced with computers	T1=Tests at the beginning of surgery course. T2=Tests at the end of surgery course. 21 parameters observed during the tasks "lifting and grasping" and "Fine dissection" on LapSim VRS	Positive. "Evaluate the suitability of a VRS (virtual reality simulator) for the assessment in a surgical skills course" Previous VGE strongly influence results
Borahay MA et al. ²⁴	9 high-school students, 8 college students and 11 residents	Self-reported, including PC-based games. Quantitative evaluation (hours per day/week). Types of consoles used and types of games played were delineated.	Mimic Technologies dV-Trainer platform (Mimic Technologies Inc, Seattle, WA, USA) and 3-Dmed Trainer platform (3-DMEd, Franklin, OH, USA)	Positive, but vague. Could not find a specific analysis showing how certain video game exposure (to specific types of games) improves skills needed for MIS. The authors suggest that gaming could be useful part of training
Abbas et al. ²⁵	Medical students. Total (n=101). Second year (n=66). Third year (n=35).	Prior VG-users (n=71) Play time at peak years - 5.5 h/w Median duration of VG - 12 years	PEG-transfer test and circle cutting. Two 1h sessions, two weeks apart	Positive but not primary outcome in the study "Teaching surgical skills to med students. The course will improve laparoscopic skills and increase interest in a surgical career" Pre- and post-instruction survey. 82 students performed both pre-and post-instruction survey

VG: video games; VGE: video game experience; MIS: miniinvasive surgery; VRS: virtual reality simulator

with little experience. They were subjected to different tasks performed on a minimally invasive surgical trainer – virtual reality (MIST-VR) simulator for one month. Experience with VG was assessed through self-reported questionnaires and it turned out that people with current or previous experience of playing such games performed better than the others.

Rosser et al.²² also found a positive correlation between previous or current VG experience and laparoscopic skills, measured by the TopGun laparoscopic Skills and Suturing Program.

Lehmann et al.²³, in a training laparoscopy course, found that previous computer game experience strongly influenced manual skills – particularly lifting and grasping. In their study, 80% of the participants (84 out of 105) had general experience with computers but only 16% (17

subjects) were gamers and initially performed significantly better.

High-school students and non-medical college students were compared to resident surgeons using several laparoscopic training platforms in a study by Borahay et al.²⁴ The authors showed that on simple tasks, the performance between the two groups was very similar, while, expectedly on the more complex tasks the surgeons outperformed the students. The students had a significantly higher VG experience, and it was speculated that if the resident surgeons had the same experience, they could probably be even better at the simple tasks. A question is also raised – does that mean that current generation students with VG experience would be better learners when it comes to minimally invasive or robotic-assisted surgery?

In a specially organized laparoscopic course for medical

students, Abbas et al.²⁵ found out that the intrinsic skills of males and of those who were VG users were better than the rest. The assessment after the course showed that females and non-gamers were able to “catch-up” with the others, so the advantage of gaming did not persist after a specialized training had been performed.

Interventional studies (Table 3)

In these studies, the utility of video games as a training tool or a warm-up procedure was assessed. The potential of this idea is appealing because gaming is not comparable to surgical simulators in terms of accessibility, price, availability and mobility and thus could serve as a great alternative to the sophisticated surgical simulators and training devices.

Schlickum et al.²⁶, in one of the first studies to assess the utility of VG as a training tool, allocated 22 surgical novices into three different groups – a control group and two training groups: one playing a 3-D first person shooter (FPS) game and the other playing a 2-D game. The subjects were tested in the MIST-VR and on the GI-Mentor surgical simulators before and after training. The results showed that there is a significant transfer effect of the skills acquired practicing a 3-D video game into manipulating the simulators. It is worth mentioning that people with previous FPS experience have better initial results as well.

In a test group of similar size (21 residents), Bokhari et al.²⁷ tested the applicability of Nintendo Wii as a take-home practicing tool for surgical skills. Fourteen subjects played a commercially available game – Marble Mania using a specific physical controller. The other 7 subjects did not play and served as controls. When compared for their electrocautery tasks performance, it turned out that the training group made fewer mistakes, had better ambidexterity and faster time for completion.

Boyle et al.²⁸ tried to answer a similar question but among students – they recruited 22 people without previous VG experience and allocated them to two groups – control group and training with Nintendo Wii group. Playing the Nintendo game at home for a week did lead to better results in the simulated laparoscopic tasks but the difference was not significant.

Nintendo Wii was used also by Gianotti et al.²⁹ as a training tool for 42 first- and second-year residents in different surgical departments – general, vascular and endoscopic. The intervention group were given 4 weeks of systematic training (1 hour a day, 5 days a week) and then reassessed at the same simulator tasks on Lap Mentor by Symbionix and the control group just did the two tests. Out of 16 measurable variables concerning the performance of the subjects, 13 improved significantly in the gaming group. There was improvement in the control group as well, but it was not significant and the control subjects were outperformed by their peers who had trained on Nintendo Wii.

Adams et al.³⁰ went even further and compared the effectiveness of training with two different gaming consoles (Xbox 360 and Nintendo DS) versus a traditional laparo-

scopic simulator among residents in surgery. Both gaming devices led to greater improvement of surgical motor skills compared to non-gamers. Moreover, the subjects in the gaming arms of the study shared that playing VG was fun and helped them lower their stress levels. Cooperative play on the other hand, contributed to building relationships among colleagues.

Ju et al.³¹ also compared two different gaming consoles (Nintendo Wii and PlayStation 2) but this time rather as a warm-up tool than a training tool (gaming sessions were just 30 minutes) among physicians and students. The results were somewhat better after a gaming warm-up session, but were not statistically significant.

The utility of VG as a training tool among students with no surgical experience was tested by Middleton et al.³² in a single-blinded randomized prospective study. Nintendo Wii was the console used in this trial and 23 students were divided into three groups and assessed on a Symbionix Lap-Mentor VR laparoscopic simulator at baseline and after two weeks. Those who had played the Nintendo significantly outperformed their peers.

Since the availability and affordability of the Nintendo Wii console is not comparable to the sophisticated surgical simulators, this led to development of special games that aim at training certain skills. Araujo et al.³³ and Rosser et al.³⁴ compared the effectiveness of “serious games” with commercially available ones (with primary objective – entertainment) in terms of surgical skills development. Both teams concluded that both types of games have their role and they should be used in combination rather than alone.

DISCUSSION

Although plenty of studies have been conducted in the field of VG-acquired skills and their applicability in surgical simulators, no firm conclusions have been drawn so far and there are several reasons for this. First, the questions initially asked are different and could be roughly categorized as observational studies – both prospective and retrospective and interventional ones trying to assess the utility of VG-related skills as a training or warm-up tool. Furthermore, different teams used many different methodologies and therefore the end results spurred in different directions. The subjects on which different papers focus range from school children to surgical residents with various levels of experience. The platforms being used (Nintendo, Xbox, PlayStation, etc.) also vary, as well as the games – including different genres (action, shooting, sports, adventure, strategy, etc.). Some of the researchers assess the impact of other widespread activities that are directly related to manual dexterity as playing a musical instrument, for example. Even among a group of studies trying to answer the same question, there is great incomparability in regard to the testing timeframes – ranging from several hours to several weeks and of varied intensity.

Table 3. Summary of the interventional studies

Authors	Participants	Game experience	Simulator(s)	Comments
Schlickum et al. ²⁶	Surgical novices (n=22); FPS (n=11), non-FPS (n=11). Control (n=4)	Five weeks of intensive systematic VG-training and self-rated VG experience	One task in MIST-VR and one task in GI-mentor	Positive. "Investigate transfer of systematic VG-training with different content and components to advanced simulators in relation to previous VGE, visual-spatial ability and visual working memory"
Bokhari et al. ²⁷	Medical students, right-handed (n=21). Experimental group (n=14). Control group (n=7)	Not reported	Marble Mania on Nintendo Wii ProMIS simulator	Positive. "surgical skills can be improved through take-home simulators adapted from affordable off-the-shelf gaming consoles"
Boyle et al. ²⁸	Medical and science students (n=22) without previous surgical experience	No VG-playing regularly	2 sessions with 2 physical and 1 virtual task on ProMIS Surgical Simulator. Group 2 played Nintendo Wii 3 hours between sessions	Positive but not statistically significant "Assign laparoscopic novices to receive a period of structured Wii practice and compare their performance of basic laparoscopic tasks before and after Wii"
Gianotti et al. ²⁹	I-II year general-, vascular-, endoscopic surgery (n=42)	Self-reported Inclusion criteria: Low VG-experience (<1h/w in the last 10 years)	Lap Mentor, Symbionix.4 weeks systematic Nintendo Wii training	Positive. "Investigated the influence of a four-week structured Wii training on laparoscopic skills by analysing performance metrics with a validated simulator"
Adams et al. ³⁰	Residents, general surgery (n=31)	Six weeks of gaming Lap.sim (2 h/w) XBOX 360 (6 h/w) Nintendo (3 h/w)	PEG-transfer in laparoscopic box trainer	Positive. "Evaluate the effect of VG-play on the development of fine motor and visual skills" "Will handheld video devices offer the same improvement as traditional simulators"
Ju et al. ³¹	Test group (n=42): < 12 lap cases/year (n=23). >12 lap cases/year (n=19). Each group randomized into a Wii or a PS2-group	Self-reported. 30 min of VG between Pre- and post-test	Bead-transfer and intracorporeal suturing in Box-trainer	Positive. Both Wii and PS2 improved laparoscopic skills in simulators.
Middleton et al. ³²	Surgically naive students (n=23)	Self-reported (Max 15h during the 4 w before the study)	Lap Mentor, Symbionix Nintendo Wii	Positive. "Playing Wii would improve surgical skills performance on a VR laparoscopic simulator"
Araujo et al. ³³	Medical students (surgical novices) (n=20)	Self-reported high or low (Cutoff: Average of at least 10h/w over the last year)	Practical course in surgery 4 groups (ContG) (SurgG) (ShotG) (RaceG) Min 3h/w Max 7/w of VG Surgical and VG performance evaluated after 1 and 2 weeks. Pig's feet model used for surgical assessment	Positive. "Assess the impact of VG genre on the development of basic laparoscopic skills" Tests different types of games. Also considers "open surgery", not just laparoscopy
Rosser et al. ³⁴	53 resident and 15 attending physicians (49 men and 19 women)	Not reported	Super Monkey Ball video game, the Underground video game, FLS PEG Pass, Pea Drop, and intracorporeal suturing.	Positive: Both (SMB and Underground) are effective for laparoscopic skill training, and they should be used in tandem rather than alone.

FPS: first person shooter; VG: video games; VGE: video game experience; MIST-VR: mini-invasive surgery trainer – virtual reality; VR: virtual reality; GI: gastrointestinal; PS: play station (Sony)

Another hindrance is the relatively difficult access to facilities like surgical simulators – given their price, availability and occupancy by surgeons and trainees. That being said, almost all published papers share the limitation of a very small sample size, usually ranging from 10-12 to 20-25 subjects in total which cannot provide statistical significance, not to mention the studies with several different groups. Of course, there is also the question of how accurately the different surgical stimulators reflect the actual operating environment which requires a completely different approach. Therefore, this review does not claim to answer that question at all.

The prospective studies are the most abundant in our review, and they are also the only ones that include negative conclusions. On the other hand, retrospective studies do show some statistically significant advantage among gamers as compared to their peers, so a plausible explanation of this discrepancy is that gaming really does lead to a small advantage while acquiring surgical skills, but the effect is too slim to tip the scales of statistical significance and a lot of other factors (training, experience, dexterity, etc.) also play a role in forming a skilled surgeon.

A combination of a retrospective and an interventional approach would be necessary to assess whether the advantage that might come with VG experience refers to current skill level or rather the ability to learn more quickly or probably – to both. The review by Green CS³⁵ emphasizes the learning effectiveness.

Given the variety of studies and their results, it is expected to have reviews which come to different conclusions – both positive (Jalink)³⁶ and negative (Glassman)³⁷. Those results just underline the need of a more systematic approach to the problem which would hopefully bring more sound results.

Video games do not tend to decrease their presence in our lives, especially the lives of the younger generations, in fact, we could expect that this field would develop further and become even more popular, and at the same time, more affordable. Similar things could be said about robotic surgery, endoscopic procedures, and the different simulators designed to prepare better physicians. Utilizing a method that could train dexterity, hand-eye coordination and visual-spatial orientation that could be both fun and cheap is an extremely tempting goal. However, for this to be properly backed up by scientific evidence, further efforts are needed.

The view of the authors of this review is that adequate study designs should be carefully devised and ideally applied in multicentric studies in order to obtain larger data volumes. The questions being asked should be accurate and precise and the methodologies – standardized. Thus, the potential benefits (and flaws) of gaming in acquiring surgical skills could be outlined and the items that prove to be helpful might be included in official curricula in surgery-related training centres. At the same time, of course, the research on how close virtual stimulators are to real life operations should definitely continue.³⁸

CONCLUSIONS

Video games – a source of entertainment in general – are extremely widespread nowadays and are being enjoyed by millions regardless of age and sex. It has been postulated that video game experience could give some advantages in laparoscopy. However, any previous video games experience as a catalyst of acquiring new skills in surgery has not produced any strong evidence so far. This review revealed that this might be due to the various aims, approaches and results of the different studies. However, although video games could be used as a daily warm-up or as a tool to speed up mastering new skills, their exact value remains to be elucidated in further, more focused studies.

Author contributions

Study concepts: K.G., J.H., and L.E.; study design: P.D., J.H., and B.M.; data acquisition: J.H., K.G., and P.D.; manuscript preparation: P.D. and K.G.; manuscript editing: L.E., K.G., and P.D.; manuscript review: B.M. and L.E.

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Влияние видеоигр на симуляционное обучение по хирургии: систематический обзор

Петар Димов¹, Джени Хуртиг², Константинос Георгиу³, Димитиос Теодору³,
Благой Маринов^{1,4}, Ларс Енохсон²

¹ Кафедра патофизиологии, Медицинский университет – Пловдив, Пловдив, Болгария

² Кафедра хирургических и периперационных наук, Университет Умео, Лулео, Швеция

³ Первая кафедра пропедевтической хирургии, Больница Гиппократ – Афины, Национальный университет им. Каподистрия, Афины, Греция

⁴ Медицинский симуляционный центр, Исследовательский институт при Медицинском университете – Пловдив, Пловдив, Болгария

Адрес для корреспонденции: Кафедра патофизиологии, Медицинский университет – Пловдив, бул. „Васил Априлов“ № 15А, 4002 Пловдив, Болгария; E-mail: pdimov@pathophysiology.info; Тел.: +359 887 791 086

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Резюме

Введение: Видеоигры благотворно влияют на навыки, необходимые для лапароскопической хирургии. В нескольких исследованиях изучалось влияние видеоигр на лапароскопические навыки.

Цель: Это исследование направлено на обеспечение систематического обзора имеющихся данных.

Материалы и методы: Была применена стратегия поиска для извлечения соответствующих статей из баз данных MEDLINE и SCOPUS. Опубликованные статьи прошли дополнительную оценку согласно заданным критериям включения / исключения.

Результаты: В этот систематический обзор было включено 26 статей. Они включали проспективные (n=9), ретроспективные (n=5) и интервенционные (n=12) исследования. Другие статьи цитировались в разделе обсуждения. Опросы с положительными результатами значительно превосходили отрицательные (21 против 5 соответственно).

Заключение: Хотя существует мало доказательств того, что видеоигры могут дать какие-либо преимущества при лапароскопии, окончательных выводов сделать нельзя. Причина этого кроется в разных целях, подходах и результатах различных исследований. Игры можно использовать как ежедневную разминку или как инструмент для ускорения приобретения новых навыков. Стандартизированный протокол необходим для ответа на различные вопросы, касающиеся влияния практики видеоигр на развитие и улучшение лапароскопических навыков.

Ключевые слова

лапароскопические навыки, минимально инвазивная хирургия
