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MESTRADO INTEGRADO EM MEDICINA

Video-based Learning for Basic Surgical Skills - A Randomized Trial

Isabel Maria Mesquita Dantas

M

2025

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UC Dissertação - DECLARAÇÃO DE INTEGRIDADE

Eu, Isabel Maria Mesquita Dantas, abaixo assinado, nº mecanográfico 201905726, estudante do 6º ano do Ciclo de Estudos Integrado em Medicina, na Faculdade de Medicina da Universidade do Porto, declaro ter actuado com absoluta integridade na elaboração do meu trabalho de Dissertação ou Monografia.

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UC Dissertação – DECLARAÇÃO DE REPRODUÇÃO

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DESIGNAÇÃO DA ÁREA DO PROJECTO

Ciências médicas e da saúde

TÍTULO DISSERTAÇÃO/MONOGRAFIA (riscar o que não interessa)

Video-based Learning for Basic Surgical Skills - A Randomized Trial

ORIENTADOR

Vítor Nuno Neves Lopes, MD PhD

COORIENTADOR (se aplicável)

Abel Filipe Santiago Nicolau, MSc

ASSINALE APENAS UMA DAS OPÇÕES:

É AUTORIZADA A REPRODUÇÃO INTEGRAL DESTE TRABALHO APENAS PARA EFEITOS DE INVESTIGAÇÃO, MEDIANTE DECLARAÇÃO ESCRITA DO INTERESSADO, QUE A TAL SE COMPROMETE.	☐
É AUTORIZADA A REPRODUÇÃO PARCIAL DESTE TRABALHO (INDICAR, CASO TAL SEJA NECESSÁRIO, Nº MÁXIMO DE PÁGINAS, ILUSTRAÇÕES, GRÁFICOS, ETC.) APENAS PARA EFEITOS DE INVESTIGAÇÃO, MEDIANTE DECLARAÇÃO ESCRITA DO INTERESSADO, QUE A TAL SE COMPROMETE.	☐
DE ACORDO COM A LEGISLAÇÃO EM VIGOR, (INDICAR, CASO TAL SEJA NECESSÁRIO, Nº MÁXIMO DE PÁGINAS, ILUSTRAÇÕES, GRÁFICOS, ETC.) NÃO É PERMITIDA A REPRODUÇÃO DE QUALQUER PARTE DESTE TRABALHO.	☒

Faculdade de Medicina da Universidade do Porto, 24/01/2025

Assinatura conforme cartão de identificação: Isabel Dantas

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UC Dissertação - DECLARAÇÃO DE TRANSPARÊNCIA RELATIVAMENTE À UTILIZAÇÃO DE FERRAMENTAS DE CHATBOT GENERATIVO BASEADAS EM LARGE LANGUAGE MODELS

Eu, Isabel Maria Mesquita Dantas, abaixo assinado, nº mecanográfico 201905726, estudante do 6º ano do Ciclo de Estudos Integrado em Medicina, na Faculdade de Medicina da Universidade do Porto, declaro que:

☒ Não procedi à utilização de ferramentas de *chatbox* generativo baseadas em *large language models* para nenhuma das tarefas no contexto do meu trabalho de Dissertação ou Monografia

☐ Procedi à utilização de ferramentas de *chatbox* generativo baseadas em *large language models* no contexto do meu trabalho de Dissertação ou Monografia, encontrando-se todas as interacções (*prompts* e respostas) transcritas em anexo bem como a indicação das aplicações utilizadas.

Neste sentido, confirmo que a eventual utilização de ferramentas de *chatbox* generativo baseadas em *large language models* no contexto do meu trabalho de Dissertação ou Monografia foi exclusivamente descrita na sequência de *prompts* e respostas transcritos em anexo e nas aplicações indicadas.

Faculdade de Medicina da Universidade do Porto, 24/01/2025

Assinatura conforme cartão de identificação:

Isabel Dantas

Dedicatória

O presente trabalho representou um desafio gratificante, um momento único de desenvolvimento pessoal e profissional, principalmente no amadurecimento da metodologia da investigação científica que sempre se me figurou inalcansável. Este conseguimento só foi possível com a ajuda preciosa de diversas pessoas entre as quais agradeço:

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À minha família pela incondicional ternura, que me apoiou em todos os passos da minha vida e na realização deste trabalho, e mais ao meu avô, Hernani Mesquita, à minha avó, Guilhermina Dantas, à minha bisavó, Laura Carvalho, que continuam a zelar por mim.

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Ao Filipe Pinto, à Maria Beatriz Oliveira e à Maria Inês Coutinho,

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Ao Dr. Leonel Neves e ao Dr. Miguel Venâncio,

por toda a amizade e suporte, bem como por me terem acompanhado ao longo do meu percurso académico e do meu crescimento individual.

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Agradeço a Deus pela motivação, e por fazer com que os meus objetivos fossem alcançados, rodeada de aceitação incondicional e compreensão.

Title: Video-based Learning for Basic Surgical Skills - A Randomized Trial

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Keywords: Video-based Learning; Basic Surgical Skills; mOSATS; Surgical Education; Teaching Methods

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Title: Video-based Learning for Basic Surgical Skills - A Randomized Trial

Highlights

- Video-based learning is a viable alternative to tutor-based teaching
- The video-based learning group achieved higher OSATS scores in retention testing
- Video-based learning incurs lower indirect costs; more efficient resource management

Title: Video-based Learning for Basic Surgical Skills - A Randomized Trial

Abstract

Objective: The authors sought to evaluate how video-based learning compares to traditional learning method in basic surgical skills.

Design: Prospective, randomized and blinded case-control study.

Setting: Faculty of Medicine, University of Porto.

Participants and methods: Fifty medical students were randomized into two groups: traditional learning (1-hour and 30-minutes in-person course) and video-based learning. Four different sutures were taught to both groups: simple interrupted, cruciate mattress, horizontal mattress and vertical mattress sutures.

A first evaluation was conducted following the learning sessions, and a retention evaluation was performed after two weeks.

Both groups were compared for quality of performance (using a modified Objective Structured Assessment of Technical Skills scale), time to complete the procedure, and participant satisfaction and self-evaluation (using a Likert-like questionnaire). The frequency and duration of autonomous training by the video-based learning group was documented.

Results: The quality of performance was similar in the first evaluation, except for the horizontal [25.88 (SD 3.58) vs 28.28 (SD 3.79), $p = 0.04$] and vertical mattress sutures [24.14 (SD 3.59) vs 28.44 (SD 3.69), $p < 0.01$], where the video-based learning group exhibited higher mOSATS scores. In the retention evaluation, the video-based learning group demonstrated higher mOSATS ratings. No statistically significant difference was found in participant satisfaction and self-evaluation.

Time spent learning and practicing with the videos was 45 minutes longer [median in hours: 2:15:30 (IQR 2:17:44)] than the in-person course duration. Overall, the traditional learning group's participants were faster at completing all the sutures, in both the first ($p < 0.01$) and retention ($p < 0.01$) evaluations.

Conclusion: Video-based learning may be an effective alternative to traditional teaching of basic surgical skills in performance quality and retention, though resulting in slower completion of the gesture. This method enables a more efficient resource allocation and cost savings, positioning it as a sustainable option.

Keywords: Video-based Learning; Basic Surgical Skills; mOSATS; Surgical Education; Teaching Methods

Introduction

The paradigm of surgical education is shifting. Surgical techniques' teaching has been based on the adage "see one, do one, teach one", the traditional method in which the gesture is taught in person, through a tutor-student pair. However, the evolution of patients' expectations, the rising costs of the time spent on the operating room, the restriction of interns' work hours and the implementation of less invasive techniques, have contributed to the reduction of opportunities to learn and practice these techniques.(1-3) The burden these concerns place on the workload of residents and specialists, reveals a growing difficulty in maintaining this method, leading to a shift in the perspective and dynamics of teaching.

Efforts to introduce innovation into medical education have been made through the creation, implementation, and evaluation of new methods.(4) Widespread access to smartphones and computers serves as a promising indicator that technology can play a significant role in educational advancements.(4) Current generations of medical students and residents have been shown to be more adept at utilizing technology in medical settings, a trend believed to correlate with their increased exposure to and time spent with various technological devices.(5) For instance, it was reported that medical trainees who played video games performed better in minimally invasive surgery.(5-7)

The increasing presence of technology in education, further accelerated by the COVID-19 pandemic's lockdowns,(8) also fostered the adoption of video-based learning. As the velocity, reproducibility and availability of video content is easily adjustable, the students can create a more individualized studying schedule, attending to their needs, without the constraint of their tutor's availability and teaching skills.(9, 10) Combining video-based learning with simulation can help provide a safe environment where students can practice techniques realistically, removing the pressure of patient discomfort and facilitating repetition.(11, 12)

Recent studies have highlighted additional advantages of video-based learning, such as promoting autonomous learning(10) and improving self-assessment.(2) Shippey *et al.* reported that video-assisted learning produced better results in skill retention compared to tutor-based teaching with expert feedback,(1) even so, further evidence is needed to fully understand the role of this method in retention.(1, 2, 10) Additionally, the optimal amount of practice time required to learn surgical skills with video support remains undefined, as other experimental studies have established specific timeframes for training within their study designs.(1, 13)

The present study aims to compare two teaching methods for basic surgical skills, addressing existing gaps in the literature. Particularly, it discusses the role of video-based learning in teaching these skills, evaluating its effectiveness as an alternative to the traditional tutor-student method and its impact on skill retention. This premise entails that practicing sutures with simulators could be optimized with instructional support via video, without the presence of a tutor. Keeping these benefits in mind, video-based learning could also contribute to more efficient resource management when integrated into medical education curricula.(1)

Material and Methods

Setting

The study was conducted at the Faculty of Medicine of the University of Porto, using the facilities and resources of the Simulation Center (SIMFMUP). It is registered on the 'ClinicalTrials.gov' platform under the number NCT06571903 and the name “Video-based Learning for Basic Surgical Skills”.

Ethical Considerations

Ethical approval was obtained from the Faculty of Medicine of the University of Porto Ethics Commission (reference 207/CEFMUP/2023) and written participant consent was obtained for each participant. This study is reported in accordance with the CONSORT criteria (Appendix A).

Participant selection and randomization

The sample size was determined using an independent samples t-test, with an anticipated medium effect size of 0.8, an alpha level of 0.05, and a desired power of 0.80. The initial power analysis indicated a required total sample size of 42 participants, divided into two groups of 21 participants each. Accounting for potential participant attrition and aiming to increase the robustness of the findings, the final sample size was adjusted to 50 participants.

Fifty medical students from the first 3 years of the Integrated Master's Degree in Medicine at the Faculty of Medicine of the University of Porto were recruited. The students were contacted via email, detailing both arms in which they could be included.

The inclusion criteria for the participants in this study were: 1) students from the 1st to 3rd years of the Integrated Master's Degree in Medicine at the Faculty of Medicine University of Porto, 2) able to participate in a course of basic surgical techniques. The exclusion criteria were: 1) participants that had prior contact with techniques surgical and/or minor surgery, 2) or in the period between recruitment and completion of the proposed learning.

All 50 recruited candidates were randomized, using an online randomization tool, into two groups: 1) traditional learning group and 2) video-based learning group, with 25 being allocated to the traditional learning group and 25 to the video-based learning group (Figure 1).

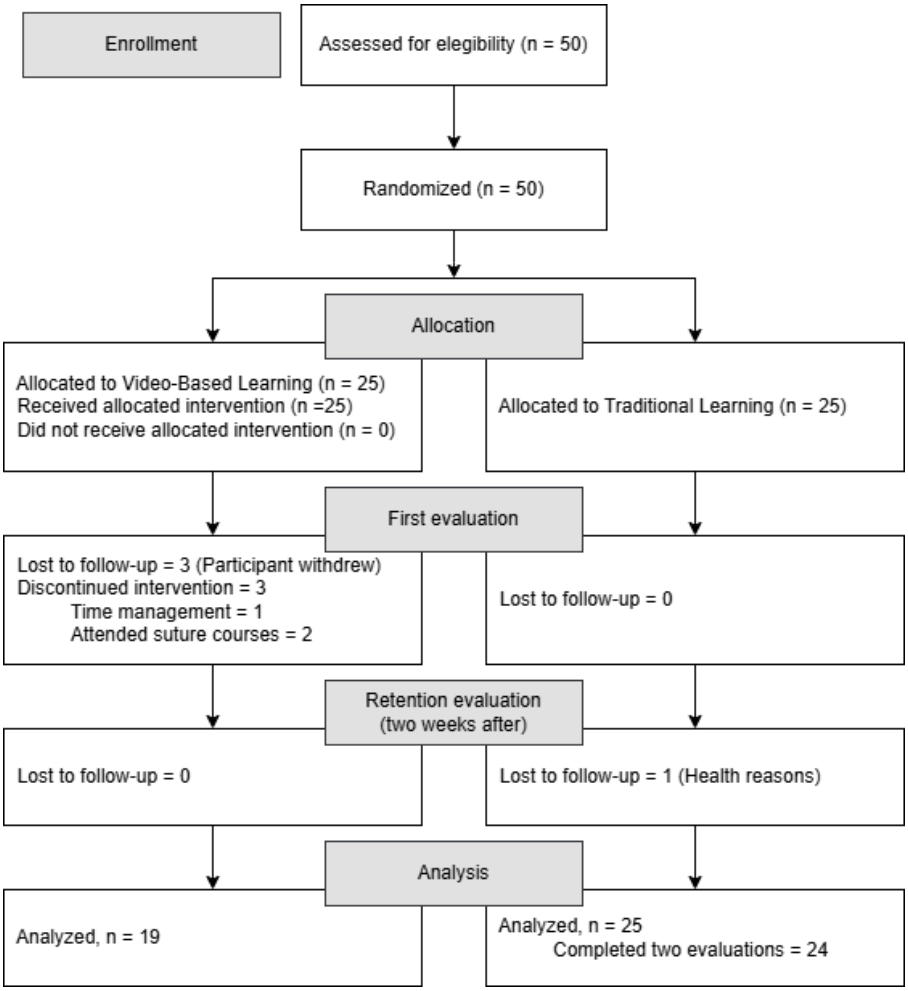


Figure 1. CONSORT Flowchart of the process of recruitment and data collection process.

Autonomous learning through video

For the video-based learning group, a room in the Simulation Center was set up for autonomous learning and practicing (Image 1), with two study seats separated with a barrier that blocked the view between the two tables. The following material was presented on each station: computers, suture kits (forceps, scissors, needle holder), suture needles and threads, and suture exercise simulation skin module pads.



Image 1. Setup for autonomous learning available to the students of the video-based learning group.

In the computer, the participants could access the video with two combined parts. The first part was a narrated slideshow (3 minutes and 41 seconds long), containing the technique and etiquette of instrument holding and a theorical introduction to sutures. It included images presenting the correct technique and explaining the function and manipulation of the enumerated surgical instruments: forceps, scissors, needle holder, suture needle and thread. In the second part (11 minutes and 56 seconds long), a specialist was recorded performing four sutures (single interrupted suture, cruciate mattress suture, horizontal mattress suture and vertical mattress suture), with a narrator detailing the technique and steps taken to complete the sutures. The participants in this group had access to the described setup for one month. They had full autonomy to navigate the video to meet their needs (rewind and pause) and had unlimited resources to practice for how long and as many times they wanted. In this group, the participants neither had any feedback on their performance nor were mentored by a tutor, at any point.

In-person course

An in-person suture course was prepared for the traditional learning group, taught by a general surgery consultant. The students in this group were divided into two groups of 13 and 12 participants, to optimize the availability of the instructor. Each group attended a session, with the duration of 1 hour and 30 minutes.

In the beginning of the session, the same 3-minute and 41-second narrated slideshow in video format, available to the students in the video-based learning group, was shown. After displaying the video, the tutor would explain and demonstrate each suture, and then let the participants try and practice the gesture, providing feedback and answering questions, only moving on to the next suture when the participants were able to complete the suture. The session was finished when all the four sutures were taught and practiced.

Outcomes

During the one-month period, the frequency and total duration of the time spent by students in the video-based learning group on learning and practicing were recorded. At the conclusion of this period, the first evaluation was conducted. Students performed the procedures while being video recorded for subsequent assessment. A second evaluation, aimed at assessing retention, was carried out two weeks later. A video record of the retention's evaluation was done as well.

For the traditional learning group, the initial evaluation was performed immediately after the course. Similar to the video-based group, all the different suturing techniques were recorded. The retention test for this group was also conducted two weeks later. The two-week interval was deliberately chosen to allow for a decline in skill, revealing the durability of the acquired knowledge, while simultaneously diminishing the risk of participant loss to follow-up.

Following the retention evaluation, it was requested to the students of both groups to answer a Likert scale questionnaire, for self-evaluation and participant satisfaction. The questionnaire included 5 questions: 1) *I feel comfortable performing a single interrupted suture*; 2) *I feel comfortable performing a cruciate mattress suture*; 3) *I feel comfortable performing a horizontal mattress suture*; 4) *I feel comfortable performing a vertical mattress suture*; 5*) I find this teaching method a viable way to learn basic surgical skills*. The questions were graded from 1 to 5.

Recording sessions and assessment of surgical skills

As previously mentioned, for the evaluations, the students were recorded performing the sutures learned in the courses. For privacy reasons, only the hands and table with the skin pad module and instruments were visible. The sutures were executed in a designated order: single interrupted suture, cruciate mattress suture, horizontal mattress suture and vertical mattress suture.

After recording, the videos were edited, using of the software Vegas Pro 14.0, to delete the audio and separate the sutures into different videos. The resulting videos were uploaded to a private Youtube® channel, to which the evaluators had access, to watch and assess, so that they could watch at their own rhythm, and be able to pause and replay at their will. The raters were unaware of the participant's identity, group allocation, and the timing of the evaluation (either immediately after the course or two weeks later). These precautions ensured that all variables in the evaluation remained blinded, thereby preserving the objectivity of the assessment. In order to guarantee that the raters were versed in basic surgery techniques, two general surgery residents and three general surgery consultants were selected from three different hospitals in Portugal.

To grade the performance of the participants a modified *Objective Structured Assessment of Technical Skills* (mOSATS) scale (Table 1) was used.(14)

	1	2	3	4	5
Respect for tissue	Often used unnecessary force on tissue or caused damage by inappropriate use of instruments		Careful handling of tissue but occasionally caused inadvertent damage		Consistently handled tissues appropriately, with minimal damage
	1	**2**	**3**	**4**	**5**
Time and motion	Many unnecessary moves		Efficient time and motion, but some unnecessary moves		Economy of movement and maximum efficiency
	1	**2**	**3**	**4**	**5**
Instruments handling	Repeatedly makes tentative or awkward moves with instruments		Competent use of instruments, although occasionally appeared stiff or awkward		Fluid moves with instruments and no awkwardness
	1	**2**	**3**	**4**	**5**
Suture technique	Clumsy and insecure, inadequately tying knots and inability to maintain tension		Careful and slow with most knots placed properly without tension		Excellent control of the suture, with proper placement of knots and correct tension
	1	**2**	**3**	**4**	**5**
Flow of operation and forward planning	Frequently stopped operating or needed to discuss next move		Demonstrated ability for forward planning with steady progression of operative procedure		Obviously planned course of operation with effortless flow from one move to the next
	1	**2**	**3**	**4**	**5**
Knowledge of the specific procedure	Deficient knowledge. Needed specific instructions at most operative steps		Knew all important aspects of the operation		Demonstrated familiarity with all aspects of the operation
	1	**2**	**3**	**4**	**5**
Quality of the final product	Very poor		Competent		Exceptional
	1	**2**	**3**	**4**	**5**
Overall performance	Very poor		Competent		Exceptional

Table 1. Modified *Objective Structured Assessment of Technical Skills* (mOSATS) scale used by the evaluators to grade the participants' performance in the videos.

Statistical analysis

Statistical analysis was performed using IBM® SPSS Statistics® version 27.0 for Macintosh (IBM, Corp, Armonk, New York, United States of America). The participants were characterized by their age, gender and year of medical course.

Variables also analyzed in this study were the time and the number of sessions the participants of the video-based learning group used to practice, the time needed to complete each suture in the initial and retention evaluations, answers to the Likert questionnaire and the surgical skills assessment by the external evaluators (modified OSATS scale). The parametric test used for continuous variables with normal distribution was the independent variable t-student test while the Mann-Whitney U test was used as the non-parametric test. Chi-square was applied to compare categorical variables. The inter-rater agreement between the evaluators for the assessment of the trainees' performance was determined using the intraclass correlation coefficient. $p \leq 0.05$ was considered statistically significant.

Results

The analyzed sample was of 25 participants on the traditional learning group and 19 participants on the video-based learning group (Figure 1).

The demographic characterization of the participants is presented in Table 2. The participants' year of medical course was of 2.00 (IQR 2), with the traditional learning group's being slightly higher [2.00 (IQR 1)] than the year of medical course of the video-based learning group [1.00 (IQR 2)], p=0.02. There were no statistically significant differences between the two groups in age (p=0.17) or gender (p=0.42).

		Traditional learning group (N=25)	**Video-based learning group** (N=19)	**Total** (N=44)	**p-value**
Age (years)		19.56 (*SD* 0.87)	19.11 (*SD* 1.29)	19.36 (*SD* 0.16)	0.17
Gender	Male	8 (66.7%)	4 (33.3%)	12 (27.3%)	0.42
	Female	17 (53.1%)	15 (47.9%)	32 (72.7%)	
Year of Medical Course		2.00 (IQR 1)	1.00 (IQR 2)	2.00 (IQR 2)	**0.02**

Table 2. Characterization of the participants by age, gender and year of medical course. *SD* = Standard Deviation. IQR = Interquartile Range. $p \leq 0.05$ indicates statistical significance.

In the video-based learning group, the overall median of time in hours spent by the students learning and practicing autonomously was of 2 hours and 15 minutes [2:15:30 (IQR 2:17:44)]. The mean of the number of sessions of practice is 2.89 (*SD* 1.243) times per month.

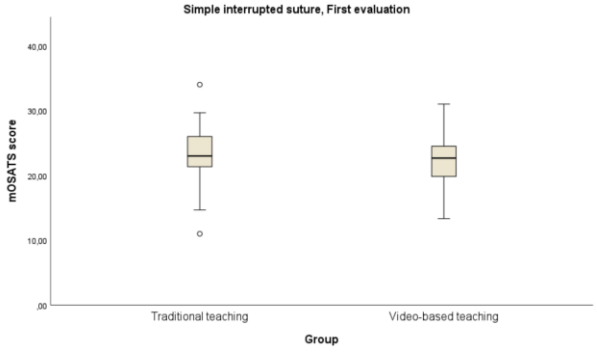
In order to ascertain that the ratings given by the evaluators allowed the comparison between the traditional group and the video-based learning group, the inter-rater agreement was assessed. To this end, the interclass correlation coefficient was calculated for their ratings: on the single interrupted suture (ICC 0.66), cruciate mattress suture (ICC 0.54), horizontal mattress suture (ICC 0.61) and vertical mattress suture (ICC 0.63). These results permitted the comparison of the ratings between the two groups.

As presented in Table 3, the scores of the video-based learning group are predominantly higher than the ones of the traditional learning group. In the first evaluation, it can be observed that the students in the traditional learning group tend to present better mOSATS score on the simple interrupted suture and cruciate mattress suture, although there is no statistically significant difference. In the horizontal mattress suture ($p=0.04$) and vertical mattress suture ($p<0.01$), the video-based learning group accomplished better results. In the retention evaluation, the mOSATS scores of the video-based learning group were statistically significantly higher, with the exception of the cruciate mattress suture ($p=0.68$). The comparison between these scores is represented in Figure 2.

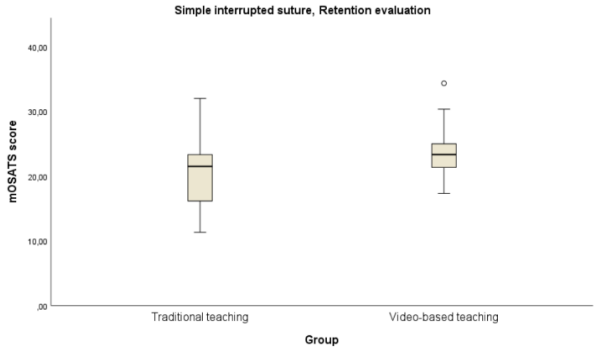
Suture	**Traditional learning group** (mOSATS score)	**Video-based learning group** (mOSATS score)	**Total** (mOSATS score)	**p-value**
Simple interrupted suture, First evaluation	23.20 (*SD* 4.92)	22.26 (*SD* 4.41)	22.72 (*SD* 4.70)	0.52
Simple interrupted suture, Retention evaluation	20.82 (*SD* 5.40)	23.84 (*SD* 4.10)	22.31 (*SD* 5.08)	**0.05**
Cruciate mattress suture, First evaluation	24.55 (*SD* 4.41)	24.42 (*SD* 4.12)	24.74 (*SD* 4.35)	0.92
Cruciate mattress suture, Retention evaluation	23.15 (*SD* 5.57)	23.75 (*SD* 3.34)	23.73 (*SD* 4.65)	0.68
Horizontal mattress suture, First evaluation	25.88 (*SD* 3.58)	28.28 (*SD* 3.79)	26.88 (*SD* 3.87)	**0.04**
Horizontal mattress suture, Retention evaluation	24.38 (*SD* 4.79)	29.98 (*SD* 3.29)	27.18 (*SD* 4.57)	**< 0.01**
Vertical mattress suture, First evaluation	24.14 (*SD* 3.59)	28.44 (*SD* 3.69)	26.07 (*SD* 4.25)	**< 0.01**
Vertical mattress suture, Retention evaluation	25.66 (*SD* 4.57)	28.64 (*SD* 2.54)	27.01 (*SD* 4.04)	**0.02**

Table 3. Mean scores given by the reviewers, using the modified OSATS scale. *SD* = Standard Deviation. $p \leq 0.05$ indicates statistical significance.

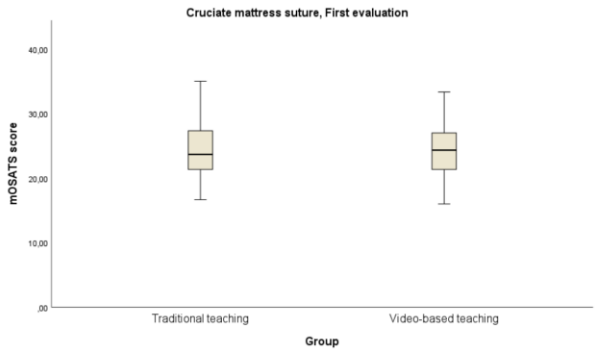
A.


Simple interrupted suture, First evaluation
mOSATS score
40,00
30,00
20,00
10,00
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Traditional teaching
Video-based teaching
Group

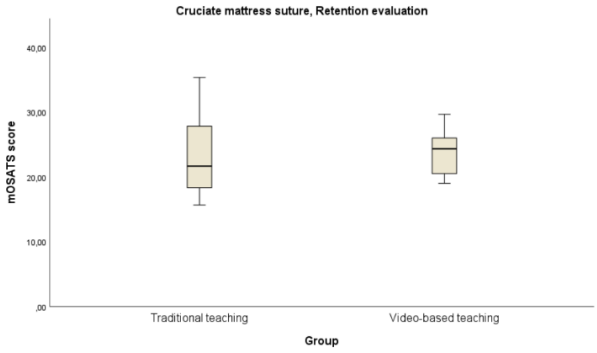
B.


Simple interrupted suture, Retention evaluation
mOSATS score
40,00
30,00
20,00
10,00
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Traditional teaching
Video-based teaching
Group

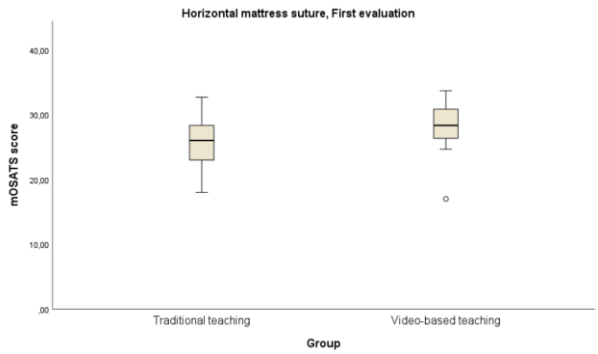
C.


Cruciate mattress suture, First evaluation
mOSATS score
40,00
30,00
20,00
10,00
,00
Traditional teaching
Video-based teaching
Group

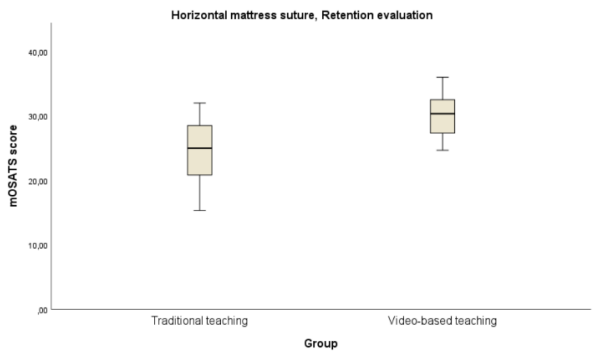
D.


Cruciate mattress suture, Retention evaluation
mOSATS score
40,00
30,00
20,00
10,00
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Traditional teaching
Video-based teaching
Group

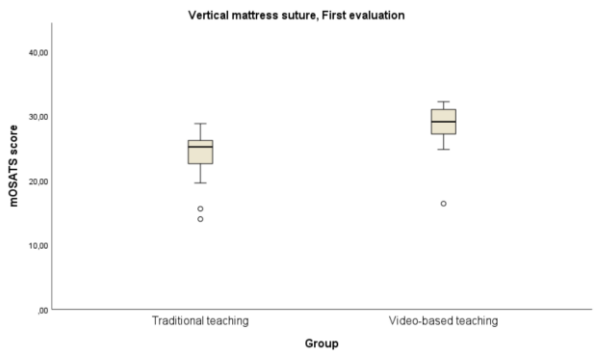
E.


Horizontal mattress suture, First evaluation
mOSATS score
40,00
30,00
20,00
10,00
,00
Traditional teaching
Video-based teaching
Group

F.


Horizontal mattress suture, Retention evaluation
mOSATS score
40,00
30,00
20,00
10,00
,00
Traditional teaching
Video-based teaching
Group

G.


Vertical mattress suture, First evaluation
mOSATS score
40,00
30,00
20,00
10,00
,00
Traditional teaching
Video-based teaching
Group

H.

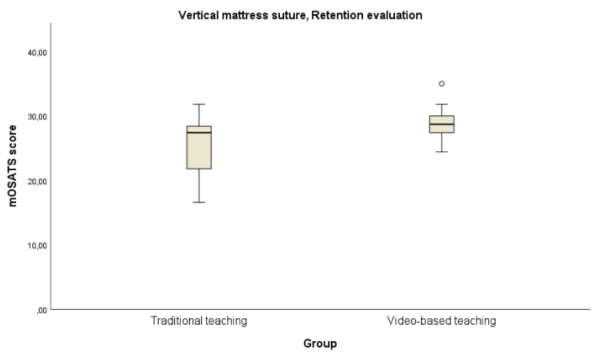

Vertical mattress suture, Retention evaluation
mOSATS score
40,00
30,00
20,00
10,00
,00
Traditional teaching
Video-based teaching
Group

Figure 2. Boxplots comparing the mOSATS scores between the traditional learning group and video-based learning group for each suture and evaluation moment **A.** Simple interrupted suture, first evaluation. **B.** Simple interrupted suture, retention evaluation. **C.** Cruciate mattress suture, first evaluation. **D.** Cruciate mattress suture, retention evaluation. **E.** Horizontal mattress suture, first evaluation. **F.** Horizontal mattress suture, retention evaluation. **G.** Vertical mattress suture, first evaluation. **H.** Vertical mattress suture, retention evaluation.

In Table 4, we can see the time spent on performing each procedure, in the first and retention evaluations. There is a statistically significant difference between the groups, indicating that students in the traditional learning group required less time to complete the sutures, both overall and for each individual suture, compared to students in the video-based learning group, in both the first and retention evaluations.

Time	**Traditional learning group** (seconds)	**Video-based learning group** (seconds)	**Total** (seconds)	**p-value**
Simple interrupted suture, First evaluation	87.96 (*SD* 28.85)	122.74 (*SD* 30.89)	102.10 (*SD* 31.77)	**< 0.01**
Simple interrupted suture, Retention evaluation	84.17 (*SD* 25.60)	115.47 (*SD* 35.63)	98.00 (*SD* 33.23)	**0.02**
Cruciate mattress suture, First evaluation	116.84 (*SD* 32.38)	190.05 (*SD* 63.81)	147.73 (*SD* 55.12)	**< 0.01**
Cruciate mattress suture, Retention evaluation	106.50 (*SD* 33.34)	165.00 (*SD* 55.12)	132.05 (*SD* 51.13)	**< 0.01**
Horizontal mattress suture, First evaluation	129.76 (*SD* 37.70)	182.00 (*SD* 50.60)	153.55 (*SD* 50.36)	**< 0.01**
Horizontal mattress suture, Retention evaluation	109.63 (*SD* 28.65)	156.37 (*SD* 50.33)	129.58 (*SD* 43.13)	**< 0.01**
Vertical mattress suture, First evaluation	127.40 (*SD* 42.90)	166.72 (*SD* 49.14)	146.73 (*SD* 48.62)	**0.01**
Vertical mattress suture, Retention evaluation	111.91 (*SD* 36.86)	150.44 (*SD* 53.53)	129.25 (*SD* 48.56)	**0.01**
Total, First evaluation	461.96 (*SD* 122.85)	647.61 (*SD* 159.95)	539.67 (*SD* 166.04)	**< 0.01**
Total, Retention evaluation	417.14 (*SD* 104.78)	576.56 (*SD* 171.70)	488.88 (*SD* 158.79)	**< 0.01**

Table 4. Time needed to complete the sutures in the first and retention evaluations. *SD* = Standard Deviation. $p \leq 0.05$ indicates statistical significance.

In the statement "*I find this teaching method a viable way to learn basic surgical skills*", the traditional learning group [4.67 (*SD* 0.57)] reported a higher score than the video-based learning group [3.74 (*SD* 1.33)], p=0.01. Nevertheless, when comparing the additional statements and in total, there was no statistically significant difference between the two groups, as the participants stated feeling comfortable performing the sutures.

Statement	Traditional learning group	Video-based learning group	Total	p-value
"I feel comfortable performing a single interrupted suture"	4.58 (*SD* 0.51)	4.63 (*SD* 0.50)	4.60 (*SD* 0.50)	0.75
"I feel comfortable performing a cruciate mattress suture"	4.42 (*SD* 0.59)	4.00 (*SD* 1.16)	4.23 (*SD* 0.90)	0.40
"I feel comfortable performing a horizontal mattress suture"	4.21 (*SD* 0.89)	4.32 (*SD* 0.48)	4.26 (*SD* 0.73)	0.64
"I feel comfortable performing a vertical mattress suture"	3.92 (*SD* 0.83)	3.84 (*SD* 1.07)	3.88 (*SD* 0.93)	0.80
"I find this teaching method a viable way to learn basic surgical skills"	4.67 (*SD* 0.57)	3.74 (*SD* 1.33)	4.26 (*SD* 1.07)	**0.01**
Total	21.79 (*SD* 2.23)	20.53 (*SD* 3.47)	21.23 (*SD* 2.88)	0.15

Table 5. Participants' satisfaction and self-evaluation. *SD* = Standard Deviation. $p \leq 0.05$ indicates statistical significance.

Discussion

With technological development and other innovative approaches to teaching, it was observed that students are flexible to different presentations of content, and are able to study autonomously to prepare for exams or practice new concepts.(9) The authors posit that video-based learning could yield similar outcomes, among both undergraduate students and surgery residents for basic surgical procedures. Since undergraduate medical students have limited opportunities to acquire and practice suturing skills prior to

its application in a clinical setting, we believe that the option to partake in this study is a valuable enhancement to their medical education. When comparing the two groups, we can see that, in terms of performance quality, the video-based learning group outperformed the traditional learning group as it generally achieved higher mOSATS scores in the initial and retention evaluations. Nonetheless, the traditional learning group completed the sutures more quickly in both evaluations. The students from both groups indicated a high level of confidence when executing the gesture, although the video-based learning group demonstrated slightly lower satisfaction. It can be concluded that watching and practicing with an instructional video is an effective strategy, particularly in quality of performance and retention.

Provided by the evaluators, the mOSATS ratings of the traditional learning and video-based learning groups, in the initial evaluation of the techniques, were only similar for the single interrupted suture ($p=0.52$) and cruciate mattress suture ($p=0.92$). As this first assessment was done promptly after the learning moment in both groups, these results are a good indicator of the quality of both teaching methods at hand. The remaining results from the first evaluation indicate better scores in the horizontal [traditional: 25.88 (*SD* 3.58) vs video-based: 28.28 (*SD* 3.79), $p=0.04$] and vertical mattress sutures [traditional: 24.14 (*SD* 3.59), vs video-based: 28.44 (*SD* 3.69), $p< 0.01$]. This could be explained by the fatigue of learning all sutures in one course in the traditional setting, compared with the possibility of managing the studying and practicing according to personal preference, with the videos, along with a longer timeframe.(15) In the retention evaluation, the mOSATS ratings showed higher scores for the video-based learning group, in all the evaluated sutures. This indicates that the method can achieve better results in the retention of the learned technique. Some studies have inferred that virtual courses can result in a better understanding, increased knowledge and higher confidence in surgery topics,(9) as Tellez *et al.* demonstrated in a trial where general surgery interns who received virtual instruction gained proficiency in suturing and knot-tying skills earlier and with less coaching, the crucial point was the access to the material and having time to practice.(16) The higher scores in the retention evaluation could be justified by the opportunity to go through all the stages of learning the suture at their own pace and then practice, reaching the autonomous stage, where they can auto-correct, analyze their performance and memorize.(3) Also, better retention is expected due to the use of long-term memory when studying autonomously, as self-explanation could improve learning by supporting the integration and organization of new information with already existing knowledge, and practicing it,(4, 15) while benefiting from a stress free environment.(3)

The time required to complete each suture serves as a useful indicator when assessing the learning progression of the participants.(1, 2) In regards to this, we can observe that the students took increasingly longer to execute the procedures. This is expected according to the increasing difficulty of each suture. The exception for this is the vertical mattress suture, in which the participants of both groups appear to have taken less time to complete when compared to the horizontal mattress suture. We can also see that the students from the traditional learning group took significantly less time to complete every suture, when compared to the group that learned through video in both evaluations. This could be explained by the immediate verbal and practical feedback from the tutor, which could accelerate the learning process of the suture, reduce hesitation, improve the flow of the procedure, and shorten the total time required. Furthermore, an expert can identify misunderstandings and specific difficulties by physical cues and facial expressions, and can adjust the pace of the course to the evolution and capacity of the students, in the stipulated time.(3, 17)

In order to assess the applicability of a teaching method, the authors found it useful to perceive the medical students' opinion, using a satisfaction and self-evaluation questionnaire. The students from both

groups have similar self-evaluation results and satisfaction is slightly higher in the in-person course although the difference is not statistically significant (p=0.15). However, in relation to the statement "I find this teaching method a viable way to learn basic surgical skills", we found that the students in the traditional learning group agreed more [4.67 (*SD* 0.57)] than the ones in the video-based learning group [3.74 (*SD* 1.33)], p=0.01. The authors theorize that the lower ratings, could be due to the lack of individualized feedback adjusted to the specific needs of each student in the video-based teaching method, since some students require active verbal feedback to be able to learn a new skill.(12, 17) The lack of feedback is the biggest disadvantage of this method. As students have a limited self-assessment capacity, errors are left uncorrected and the wrong technique could be mechanized.(15) An analysis of the mOSATS results indicates that students were generally able to assess their performance and compare it with the video, as the quality of their performance was comparable to or exceeded that of the traditional group. Although the errors did not significantly impact the overall quality of the performance, Rogers *et al.* previously reported students' frustration, stemming from their awareness that their performance did not align with that of experts while being unable to identify their mistakes.(13) Even so, it can be observed that, while students in the in-person course receive immediate verbal feedback with individualized corrections, the time allocated by the tutor for each correction and the ability to simultaneously detect errors across all students is limited. Consequently, error correction within this group could also be insufficient. One way to address this limitation would be to ensure the presence of a tutor for each student, which proves impractical in the context of in-person courses and even more challenging for basic surgical skills training in a clinical setting.

Even so, the lack of tutor feedback, reinforces the role of the introduced video-based method as an adjuvant, for the traditional teaching method. (12, 18-20) Another potential factor contributing to the lower satisfaction may be related to time investment, as highlighted by students who were unable to participate in the study, given that their schedules are already heavily saturated with classes and extracurricular activities. As the traditional method is widely and conventionally used, the high satisfaction is to be expected, while also suggesting that the in-person course was of adequate quality.

So as to observe the time required for a student to learn the procedures via video, as, like mentioned earlier, it was an unanswered question from previous studies,(1) the students were granted full autonomy in utilizing the room, with the only limitation being the availability of space, should it be occupied by two other participants. The median of the total time spent learning and practicing was 2 hours and 15 minutes, during the one-month period. Given that the in-person course's duration was of 1 hour and 30 minutes, it took the video-based learning group's participants, on average, 45 minutes longer to learn the sutures. As mentioned before, the overall quality of the performance of the video-based learning was better than the traditional learning, especially in retention, so, with this in mind, it could possibly be inferred that the tested methodology is more effective than the in-person course.

Other examples of video-based learning have been documented in the literature, however, the time allocated for learning was predetermined, making it difficult to quantify and compare the practice duration required to achieve similar reported outcomes.(1, 2) Our findings are noteworthy, as this study registered the time spent learning, in a large timeframe for free autonomous learning, to establish how much time students would train by their own volition and the time they needed to learn the sutures. Furthermore, the addition of the second evaluation allowed for the analysis of skill retention, as there is a need for evidence regarding the role of this method in retention,(1) which yielded superior results for the video-based learning group for a two-week timeframe. The authors also selected evaluators from

three different hospitals across the country. These diverse backgrounds help reduce systematic errors in score attribution, as professionals from various institutions and levels of expertise may differ in their expectations and attention to detail. This way, these gaps from previous studies (1, 2) were addressed, whilst hypothesizing that learning through video is a viable and reproductible alternative.

Upon characterizing the groups, it can be observed that, there is no statistically significant difference in age and gender. Nonetheless, although the year of medical study is slightly higher in the traditional teaching group [traditional: 2.00 (IQR 1) vs video-based: 1.00 (IQR 2), p=0.02], this was not considered relevant by the authors as it did not influence the results. Students in the first three years of the program have yet to be exposed to clinical practice and, therefore, have no prior experience with basic surgical skills. Furthermore, the same theoretical video was utilized in both courses, ensuring that all students acquired equivalent knowledge of the procedures, thereby minimizing any potential differences in the information acquired by the two groups.

A limitation of this study lies in the method used to select the participants. Since the students volunteered to enroll, and were recruited by convenience, a healthy-volunteer bias has to be accounted for, as these students are more likely to participate and have better time management and self-discipline to be able to maintain a regular study schedule. To minimize this bias the participants were randomized into the two groups, so the difference between them would be reduced.

One could argue that one limitation of this study is inherent to the method of autonomous learning. Although all participants were instructed to not study nor practice the techniques outside the room and the determined conditions, it could not be assured that no other sources or materials would be used in the month-long period the video-based learning group had. This could justify a better performance initially than the one from the traditional learning group. To mitigate this disparity, both groups were informed of the evaluation dates in advance and were given the same amount of time prior to the first evaluation. Additionally, they were not provided with detailed information regarding the specific techniques or criteria for the assessment beforehand. All students were also instructed that, when any other means were accessed, they should notify the authors so they could be excluded from the study. During the period leading up to the retention evaluation, both groups were once again instructed not to practice or study, and no interaction occurred between the two groups, while keeping the same regulations established for the first evaluation.

One disadvantage of incorporating simulation in medical education that is thoroughly discussed is the price of simulation equipment, supplies and their maintenance and requirements of trained personnel, especially for high-fidelity for more advanced and interactive scenarios.(20, 21) Hereby, it is pertinent to consider the costs of the courses. These costs comprise the time the instructor spent on both preparing and teaching the courses and the time and resources used to elaborate the slideshow and record the theoretical and instructional videos. The exact values are difficult to precise; however, in terms of preparation, they are comparable. Both groups viewed the same theoretical video, and the methods employed to prepare the in-person courses and produce the instructional video were analogous. This includes the sessions dedicated to recording the demonstration of the procedure and the instructor's voice-over for the video, as well as the time spent on editing. However, the in-person format incurred additional costs related to the presence and time required from the tutor to teach and supervise.

Other technology-based methods may offer outcomes comparable to traditional learning, fostering innovation in education while enhancing cost-efficiency and reducing the time demands on the

workforce.(22) Moreover, video-based learning could serve as a proactive solution to potential future disruptors, such as a health crisis, functioning both as an educational tool and as a means to create additional learning opportunities for medical students.(9) This area holds significant potential for further investigation, considering the scarcity of experimental studies.

As previously mentioned, the median of time spent studying by students in the video-based learning group was obtained. A study with varying timeframes for autonomous learning could help define the optimal amount of time needed to learn and practice basic surgical skills. Such a study would assess whether students, when provided with different amounts of study time, would take advantage of the opportunity, and how this would affect their performance in terms of speed, quality, and retention, an area where video-based learning has shown superior outcomes. Further evidence on the role of video-based learning in technique retention is also needed to support the theory that it may be more effective in promoting long-term retention.

The foregoing analysis presents video-based learning as an alternative, for the same efficacy and quality of materials offered. The retention being better in the video-based learning group could ultimately reduce the time spent reviewing these techniques in further clinical rotations or residency. The generalized use of portable technological devices capable of reproducing media supports the premise that delivering instructional content in video format, along with the necessary materials, to medical students, could improve the teaching of basic surgical skills.

Conclusion

Video-based learning may be a viable alternative to tutor-based teaching of basic surgical skills. While students in the traditional learning group were faster at completing the procedures, the video-based learning group showed better quality and retention, requiring only 45 additional minutes to learn, distributed across the one-month period. Satisfaction and self-evaluation were identical. Additionally, video-based learning incurs lower indirect costs. Combining both approaches could optimize execution speed and retention, possibly benefiting from expert feedback.

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Appendix A

CONSORT 2010 checklist of information to include when reporting a randomised trial*

Section/Topic	Item No	Checklist item	Reported on page No
Title and abstract			
	1a	Identification as a randomised trial in the title	1
	1b	Structured summary of trial design, methods, results, and conclusions (for specific guidance see CONSORT for abstracts)	1
Introduction			
Background and objectives	2a	Scientific background and explanation of rationale	2
	2b	Specific objectives or hypotheses	2
Methods			
Trial design	3a	Description of trial design (such as parallel, factorial) including allocation ratio	3
	3b	Important changes to methods after trial commencement (such as eligibility criteria), with reasons	3
Participants	4a	Eligibility criteria for participants	3
	4b	Settings and locations where the data were collected	3
Interventions	5	The interventions for each group with sufficient details to allow replication, including how and when they were actually administered	4, 5
Outcomes	6a	Completely defined pre-specified primary and secondary outcome measures, including how and when they were assessed	6, 7
	6b	Any changes to trial outcomes after the trial commenced, with reasons	
Sample size	7a	How sample size was determined	3
	7b	When applicable, explanation of any interim analyses and stopping guidelines	
Randomisation:			

Sequence generation	8a	Method used to generate the random allocation sequence	3
	8b	Type of randomisation; details of any restriction (such as blocking and block size)	3
Allocation concealment mechanism	9	Mechanism used to implement the random allocation sequence (such as sequentially numbered containers), describing any steps taken to conceal the sequence until interventions were assigned	3
Implementation	10	Who generated the random allocation sequence, who enrolled participants, and who assigned participants to interventions	3
Blinding	11a	If done, who was blinded after assignment to interventions (for example, participants, care providers, those assessing outcomes) and how	6
	11b	If relevant, description of the similarity of interventions	6
Statistical methods	12a	Statistical methods used to compare groups for primary and secondary outcomes	8
	12b	Methods for additional analyses, such as subgroup analyses and adjusted analyses	8
Results			
Participant flow (a diagram is strongly recommended)	13a	For each group, the numbers of participants who were randomly assigned, received intended treatment, and were analysed for the primary outcome	4
	13b	For each group, losses and exclusions after randomisation, together with reasons	4
Recruitment	14a	Dates defining the periods of recruitment and follow-up	4
	14b	Why the trial ended or was stopped	
Baseline data	15	A table showing baseline demographic and clinical characteristics for each group	8
Numbers analysed	16	For each group, number of participants (denominator) included in each analysis and whether the analysis was by original assigned groups	8

Outcomes and estimation	17a	For each primary and secondary outcome, results for each group, and the estimated effect size and its precision (such as 95% confidence interval)	9, 10, 11, 12
	17b	For binary outcomes, presentation of both absolute and relative effect sizes is recommended	
Ancillary analyses	18	Results of any other analyses performed, including subgroup analyses and adjusted analyses, distinguishing pre-specified from exploratory	
Harms	19	All important harms or unintended effects in each group (for specific guidance see CONSORT for harms)	
Discussion			
Limitations	20	Trial limitations, addressing sources of potential bias, imprecision, and, if relevant, multiplicity of analyses	15, 16
Generalisability	21	Generalisability (external validity, applicability) of the trial findings	12, 13
Interpretation	22	Interpretation consistent with results, balancing benefits and harms, and considering other relevant evidence	12, 13, 14, 15
Other information			
Registration	23	Registration number and name of trial registry	3
Protocol	24	Where the full trial protocol can be accessed, if available	3
Funding	25	Sources of funding and other support (such as supply of drugs), role of funders	16

Citation: Schulz KF, Altman DG, Moher D, for the CONSORT Group. CONSORT 2010 Statement: updated guidelines for reporting parallel group randomised trials. BMC Medicine. 2010;8:18.
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*We strongly recommend reading this statement in conjunction with the CONSORT 2010 Explanation and Elaboration for important clarifications on all the items. If relevant, we also recommend reading CONSORT extensions for cluster randomised trials, non-inferiority and equivalence trials, non-pharmacological treatments, herbal interventions, and pragmatic trials. Additional extensions are forthcoming: for those and for up-to-date references relevant to this checklist, see www.consort-statement.org.

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Guide for authors

Introduction

- Introduction
- Perspectives
- How I Do It
- Submission checklist

Before you begin

- Ethics in publishing
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- Submission declaration and verification
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- Copyright
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Introduction

Introduction

The *Journal of Surgical Education (JSE)* is dedicated to advancing the field of surgical education through original research. The journal publishes research articles in all surgical disciplines on topics relative to the education of surgical students, residents, and fellows, as well as practicing surgeons. Our readers look to JSE for timely, innovative research findings from the international surgical education community. As the official journal of the Association of Program Directors in Surgery (APDS), JSE publishes the proceedings of the annual APDS meeting held during Surgery Education Week.

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Manuscripts must meet the following criteria (taken from JAMA's Instructions for Authors5): the material is original; the writing is clear; the study methods are appropriate; the data are valid; the conclusions are reasonable and supported by the data; the information is important; and the topic is of interest to surgeons, educators, or trainees in any surgical disciplines. All original research papers are to follow the instructions for manuscript submission, with two additions. Each original manuscript should include four to six key words or phrases that describe the key concepts, content, or medical terminology discussed within the manuscript. These key words should appear on the title page. For help in finding key words or phrases look in the Medical Subject Headings from Index Medicus. The second page of all original research manuscripts should contain a structured abstract of, at most, 300 words, summarizing the objectives, design, setting, participants, results, and conclusions of the study.

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Perspectives are brief (max 1500 words) pieces on a current topic in surgical education. These submissions should provide an opinion or perspective on the topic, but also be grounded in the current evidence and published literature. Submissions should be original work and not published previously, but they do not need to contain original data.

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How I Do It articles enable authors to describe novel educational techniques or programs without the requirement for rigorous data; data are welcomed but not required. These submissions should be brief (max 1200 words) explanations of innovative curricula, teaching techniques, or programmatic improvements that could be applied or modified by other programs or educators to benefit surgical trainees.

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Ensure that the following items are present:

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Graphical Abstracts / Highlights files (where applicable)

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Authors can refer to the Sex and Gender Equity in Research (SAGER) guidelines and the SAGER guidelines checklist. These offer systematic approaches to the use and editorial review of sex and gender information in study design, data analysis, outcome reporting and research interpretation - however, please note there is no single, universally agreed-upon set of guidelines for defining sex and gender.

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Sex generally refers to a set of biological attributes that are associated with physical and physiological features (e.g., chromosomal genotype, hormonal levels, internal and external anatomy). A binary sex categorization (male/female) is usually designated at birth ("sex assigned at birth"), most often based solely on the visible external anatomy of a newborn. Gender generally refers to socially constructed roles, behaviors, and identities of women, men and gender-diverse people that occur in a historical and cultural context and may vary across societies and over time. Gender influences how people view themselves and each other, how they behave and interact and how power is distributed in society. Sex and gender are often incorrectly portrayed as binary (female/male or woman/man) and unchanging whereas these constructs actually exist along a spectrum and include additional sex categorizations and gender identities such as people who are intersex/have differences of sex development (DSD) or identify as non-binary. Moreover, the terms "sex" and "gender" can be ambiguous--thus it is important for authors to define the manner in which they are used. In addition to this definition guidance and the SAGER guidelines, the resources on this page offer further insight around sex and gender in research studies.

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Preparation

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Sections

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State the objectives of the work and provide an adequate background, avoiding a detailed literature survey or a summary of the results.

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Results should be clear and concise.

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The main conclusions of the study may be presented in a short Conclusions section, which may stand alone or form a subsection of a Discussion or Results and Discussion section.

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Objective: State the main question or objective of the study and major hypothesis tested, if any.

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Define abbreviations that are not standard in this field in a footnote to be placed on the first page of the article. Such abbreviations that are unavoidable in the abstract must be defined at their first mention there, as well as in the footnote. Ensure consistency of abbreviations throughout the article.

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Collate acknowledgements in a separate section at the end of the article before the references and do not, therefore, include them on the title page, as a footnote to the title or otherwise. List here those individuals who provided help during the research (e.g., providing language help, writing assistance or proof reading the article, etc.).

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It is not necessary to include detailed descriptions on the program or type of grants and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.

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3. Strunk W Jr, White EB. *The Elements of Style*. 4th ed. New York, NY: Longman; 2000.

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4. Mettam GR, Adams LB. How to prepare an electronic version of your article. In: Jones BS, Smith RZ, eds. *Introduction to the Electronic Age*. New York, NY: E-Publishing Inc; 2009:281-304.

Reference to a website:

5. Cancer Research UK. Cancer statistics reports for the UK. Accessed 13 March 2003. http://www.cancerresearchuk.org/aboutcancer/statistics/cancerstatsreport/; 2003. .

Reference to a dataset:

[dataset] 6. Oguro M, Imahiro S, Saito S, Nakashizuka T. Mortality data for Japanese oak wilt disease and surrounding forest compositions, Mendeley Data, v1; 2015. https://doi.org/10.17632/xwj98nb39r.1

Reference to software:

7. Coon E, Berndt M, Jan A, Svyatsky D, Atchley A, Kikinzon E, Harp D, Manzini G, Shelef E, Lipnikov K, Garimella R, Xu C, Moulton D, Karra S, Painter S, Jafarov E, Molins S. Advanced Terrestrial Simulator (ATS) v0.88 (Version 0.88). Zenodo; 2020, March 25. https://doi.org/10.5281/zenodo.3727209

Journal abbreviations

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PARECER

207/CEFMUP/2023

Comissão de Ética da Faculdade de Medicina da Universidade do Porto

Parecer/Rapport: 207/CEFMUP/2023

Título do projeto/ Project title: Video-based learning for basic surgical skills – a randomized trial

Investigador/ Researcher: Isabel Maria Mesquita Dantas

Parecer/ Rapport:

☒ Favorável/Accepted

☐ Rejeitado/Declined

☐ Outro

Relatora: Prof.ª Doutora Rita Negrão

Deliberado em reunião plenária da Comissão de Ética de Porto, a 15 de novembro de 2023, por unanimidade dos membros presentes.
Solicita-se o favor de após a conclusão do projeto enviar o relatório final com as conclusões do estudo, nos termos do Art.3º n.º 3 alínea f) do Decreto-Lei n.º 80/2018 de 15 de outubro.

Porto, 15 de novembro de 2023

O Secretariado da Comissão de Ética
Profª Doutora Francisca Rego

O Presidente da Comissão de Ética
Prof Doutor Rui Nunes

Alameda Professor Hernâni Monteiro, 4200-319, Porto
Email: comissaoetica@med.up.pt
Telefone: +351 220426840

Informação a Participante

"Video-based Learning for Basic Surgical Skills - A Randomized Trial"

Caro Participante,

O presente estudo, a realizar na Faculdade de Medicina da Universidade do Porto, tem como objetivo definir se a utilização do método de ensino através de vídeo é viável para aprendizagem de técnicas cirúrgicas básicas. Pretende-se avaliar a sua segurança, reprodutibilidade e compreender até que ponto a sua utilização é vantajosa quando comparado com o ensino tradicional das técnicas básicas de pequena cirurgia. Desta forma, a sua participação no estudo compreende a realização de um pequeno curso de pequena cirurgia em que terá formação local por uma pessoa com experiência em pequena cirurgia ou, caso seja sorteado para outro grupo, essa formação será feita com recurso a ensino por meio de vídeo, para estudo autónomo. No caso do ensino com tutor, o curso tem uma duração máxima estimada de 1 hora, em horário a combinar posteriormente; no caso do ensino por meio de vídeo, terá acesso ao conteúdo para aprendizagem durante 1 mês para estudo autónomo, no Centro de Simulação Biomédica, em horário também a combinar posteriormente.

No final destas formações, vamos proceder à gravação da execução dos procedimentos que aprendeu – apenas iremos gravar a área de trabalho, pelo que será impossível ser reconhecido e/ou identificado por quem veja a gravação. Após duas semanas, vamos realizar outra gravação nos mesmos moldes. Ulteriormente, essas gravações vão ser visualizadas por vários avaliadores que nunca conhecerão a sua identidade. Entenda esta informação também como um convite, pois a sua participação é totalmente voluntária. Tem toda a liberdade para a sua recusa, assim como tempo para reflectir na sua decisão, consultando o que ou quem considere relevante. Da mesma forma que pode não aceitar participar no estudo, pode solicitar a sua exclusão a qualquer momento que entenda, sem necessidade de justificar o motivo. Desta mesma forma, a sua exclusão do curso não terá qualquer tipo de repercussões. Todos os dados referentes a privacidade e confidencialidade estão salvaguardados, sendo que o Investigador é o único que conhecerá a sua identidade e garante que a mesma não será divulgada. Os dados serão guardados no computador pessoal do Investigador, e em disco externo na posse do Investigador. Após a conclusão do estudo, todas as imagens registadas serão destruídas de forma irrecuperável. Caso tenha dúvidas sobre a forma como os seus dados pessoais são tratados, para saber mais sobre os seus direitos no âmbito da proteção de dados, pode entrar em contacto com o Encarregado de Proteção de Dados do UP através do endereço de email: dados.pessoais@up.pt. Caso considere que os seus dados não estão a ser objeto de tratamento legítimo, pode, a todo o momento, apresentar uma reclamação junto da autoridade competente, a Comissão Nacional de Proteção de Dados (www.cnpd.pt).

O presente estudo foi aprovado pela Comissão de Ética da Faculdade de Medicina da Universidade do Porto.

O Investigador,
Isabel Maria Mesquita Dantas
Contacto telefónico: 910448324
E-mail: up201905726@up.pt

Investigador Supervisor: Prof. Doutor Vítor Nuno Neves Lopes
E-mail: vnlopes@med.up.pt

CONSENTIMENTO INFORMADO, LIVRE E ESCLARECIDO

Considerando a "Declaração de Helsínquia", da Associação Médica Mundial

(Helsínquia 1964; Tóquio 1975; Veneza 1983; Hong Kong 1989; Somerset West 1996; Edimburgo 2000)

Aprendizagem Baseada em Vídeo para Competências Cirúrgicas Básicas - Um Ensaio Clínico

Eu, abaixo-assinado (nome completo do doente adulto ou do voluntário)

_____

_____

declaro não estar a participar em nenhum outro projeto de investigação neste momento. Recebi o texto de *Informação ao Participante* relativo ao procedimento que concordei em efetuar. Compreendi a explicação que me foi fornecida pelo investigador que assina este documento. Foi-me ainda dada oportunidade de fazer as perguntas que julguei necessárias, e de todas obtive resposta satisfatória.

Tomei conhecimento de que, de acordo com as recomendações da Declaração de Helsínquia, a informação ou explicação que me foi prestada versou os objetivos, os métodos, os benefícios previstos, os riscos potenciais e o eventual desconforto. Além disso, foi-me afirmado que tenho o direito de recusar a todo o tempo a minha participação no estudo, bem como pedir a imediata eliminação de todos os meus dados recolhidos no âmbito o estudo, sem que isso possa ter como efeito qualquer prejuízo na assistência que me é prestada.

Por isso, consinto de forma livre e esclarecida que me seja aplicado o método, o tratamento ou o inquérito proposto pelo investigador, no âmbito deste estudo, a realizar na Faculdade de Medicina da Universidade do Porto.

Assinatura do doente ou voluntário:_____

Data:___/___/___

Nome e Assinatura do Investigador responsável:

_____

_____

Data:___/___/___

Anulação do Consentimento Informado

Declaro que recebi a *Informação ao Participante* relativo ao estudo / projeto de investigação em questão, que me foi proposto pelo investigador que assina este documento e **pretendo anular** o consentimento dado na data ____/____/____.

Assinatura do doente ou voluntário:_____

Data:___/___/___

Assinatura do Investigador responsável: _____

*D*ata:___/___/___

Nota: Fornecimento obrigatório de cópia ao participante

Protocolo de Investigação

Video-based Learning for Basic Surgical Skills - A Randomized Trial

Isabel Maria Mesquita Dantas

Orientador: Prof. Doutor Vítor Nuno Neves Lopes

Introdução

O paradigma do ensino das técnicas cirúrgicas, nas últimas décadas, tem-se baseado num método tradicional, no qual a instrução do gesto é efetuada por um tutor de forma presencial. Contudo, este método levanta questões relativamente à escassez de oportunidades e de recursos para o treino dessas técnicas. A evolução das expectativas dos pacientes, o aumento dos custos do tempo no bloco operatório, restrições de horas de trabalho aos internos e a implementação de técnicas menos invasivas, têm contribuido para a redução de momentos de ensino de técnicas cirúrgicas.[1,2]

Por este motivo, tornou-se imperativo explorar novos métodos de ensino que incrementem a acessibilidade do treino das técnicas, surgindo a utilização da simulação. Os simuladores proprocionam um ambiente seguro no qual se pode praticar os gestos de modo realístico, retirando a pressão do desconforto do paciente e permitindo a repetição, tendo-se generalizado o seu uso em várias especialidades. [3] No entanto, para o aproveitamento destes simuladores, continua a existir a necessidade da presença de um tutor para orientação do treino, pelo que se coloca a possibilidade de aliar à simulação o ensino através de vídeo.

Estudos sugerem que treino com apoio de vídeo apresenta vantagens ao permitir a revisão de porções específicas do conteúdo, promovendo o estudo autónomo, acompanhado de uma sustentada melhoria na técnica, o que pode surgerir uma melhor retenção do conteúdo transmitido. [1,2] Contando com estes benefícios, o método de ensino por meio de vídeo poderá ajudar a otimizar a alocação de recursos. [1] Trata-se de uma área rica para investigação por serem geralmente apresentados estudos observacionais.

Assim, o presente trabalho, sob a forma de um estudo prospectivo randomizado, pretende avaliar a eficácia do ensino das técnicas cirúrgicas básicas através de vídeo, comparando os resultados com os do ensino tradicional.

Objetivos

- Identificar o método de ensino através de vídeo como opção viável para ensino de técnicas cirúrgicas básicas: reprodutabilidade e eficiência
- Comparar o método de ensino através de vídeo com o método tradicional (cursos presenciais)
- Avaliar a qualidade da execução do gesto técnico e a sua retenção
- Verificar o envolvimento e o interesse dos participantes no método de ensino através de vídeo
- Aplicar questionário de satisfação aos participantes

Métodos

Serão recrutados por conveniência, por meio de um formulário de preenchimento voluntário, 50 estudantes do 1º ao 3º anos do Mestrado Integrado de Medicina da Universidade do Porto, para participar num curso de técnicas cirúrgicas básicas (sutura simples, pontos em X, pontos em U e pontos Donatti). Os estudantes serão randomizados em 2 grupos, utillizando-se a Ferramenta online "Research Randomizer" (www.randomizer.org). A um dos grupos (Grupo 1 (Controlo) – 25 alunos) será proporcionada uma sessão com um tutor. O outro grupo (Grupo 2 (Intervenção) – 25 alunos) terá acesso a um vídeo para estudo autónomo.

O critério de exclusão na seleção dos participantes é terem tido contacto prévio com técnicas cirúrgicas e/ou pequena cirurgia, assim como no período entre o recrutamento e a realização da aprendizagem proposta.

Aos alunos de ambos os grupos será apresentado um vídeo com uma introdução teórica aos instrumentos cirúrgicos, e a sua etiqueta e seu manuseamento, bem como às técnicas cirúrgicas envolvidas.

Grupo 1:

- Os estudantes irão contar com uma sessão presencial em grupo, com 1 hora de duração, com um tutor com experiência em Cirurgia Geral.
- Após esta sessão, irá ser feita a gravação de imagem e de som da execução das técnicas (sutura simples, pontos em X, pontos em U e pontos Donati em modelo inanimado): os estudantes estarão sozinhos, não podendo contar com o auxílio do tutor, sendo apenas gravadas as mãos dos executantes e os materiais/modelos.

Grupo 2:

- Os estudantes irão ter acesso a uma plataforma com credenciais atribuídas pelo investigador, que disponibiliza um vídeo com demonstração do gesto. Este acesso será facultado ao longo de um período de 1 mês, no qual poderão praticar num modelo inanimado, no Centro de Simulação Biomédica.
- No final deste período de tempo, os estudantes irão ser gravados a realizar as técnicas cirúrgicas, nos mesmos moldes descritos para o Grupo 1.

Todos os estudantes serão chamados 15 dias mais tarde para nova gravação das técnicas cirúrgicas, sem apoio dos meios antes disponibilizados.

Posteriormente, os estudantes vão preencher um questionário tipo Likert (de utilização livre) para avaliar a sua satisfação. O questionário engloba as seguintes questões:

- "Sinto que sou capaz de executar um ponto simples":
  (1- Discordo totalmente; 2 - Discordo; 3 - Indiferente; 4 - Concordo; 5 - Concordo totalmente)
- "Sinto que sou capaz de executar pontos em X":
  (1- Discordo totalmente; 2 - Discordo; 3 - Indiferente; 4 - Concordo; 5 - Concordo totalmente)
- "Sinto que sou capaz de executar pontos em U":
  (1- Discordo totalmente; 2 - Discordo; 3 - Indiferente; 4 - Concordo; 5 - Concordo totalmente)
- "Sinto que sou capaz de executar pontos Donati":
  (1- Discordo totalmente; 2 - Discordo; 3 - Indiferente; 4 - Concordo; 5 - Concordo totalmente)
- "Considero este método de ensino é uma forma viável de aprender técnicas cirúrgicas":
  (1- Discordo totalmente; 2 - Discordo; 3 - Indiferente; 4 - Concordo; 5 - Concordo totalmente)

Os vídeos serão analisados por avaliadores experientes na técnica cirúrgica básica – que desconhecem a identidade do estudante, e que método de ensino lhe foi proporcionado – , que irão pontuar o gesto técnico de acordo com a sua qualidade, usando a escala OSATS modificada (Tabela 1), sendo esta de utilização livre. Será feita a comparação dos dois grupos através desta medida e da velocidade na execução da técnica cirúrgica.

	1	2	3	4	5
Respect for tissue	Often used unnecessary force on tissue or caused damage by inappropriate use of instruments		Careful handling of tissue but occasionally caused inadvertent damage		Consistently handled tissues appropriately, with minimal damage
	1	2	3	4	5
Time and motion	Many unnecessary moves		Efficient time and motion, but some unnecessary moves		Economy of movement and maximum efficiency
	1	2	3	4	5
Instrument handling	Repeatedly makes tentive or awkward moves with instruments		Competent use of instruments, although occasionally appeared stiff or awkward		Fluid moves with instruments and no awkwardness
	1	2	3	4	5
Suture technique*	Clumsy and insecure, inadequately tying knots and inability to maintain tension		Careful and slow with most knots placed properly with proper tension		Excellent control of the suture, with proper placement of knots and correct tension
	1	2	3	4	5
Elliptical excision biopsy technique**	Lack of knowledge about the parameters (<2 mm or >10 mm margins); angles much different from 30°; lenght-width ratio very different from 3-4:1		Adequate margins (2-10mm); angle at the ellipse ends slightly different from 30°; length-width radio slightly different from 3-4:1		Adequate margins (2-10mm); 30° angles at the ellipse ends; lenght-width radio 3-4:1
	1	2	3	4	5
Flow of operation and forward planning	Frequently stopped operating or needed to discuss next move		Demonstrated ability for forward planning with steady progression of operative procedure		Obviously planned course of operation with effortless flow from one move to the next
	1	2	3	4	5
Knowledge of specific procedure	Deficient knowledge. Needed specific instruction at most operative steps		Knew all important aspects of the operation		Demonstrated familiarity with all aspects of the operation
	1	2	3	4	5
Quality of final product	Very poor		Competent		Exceptional
	1	2	3	4	5
Overall performance	Very poor		Competent		Exceptional
Maximum points Select the final grade				40 ( )	

Tabela 1 – Escala de OSATS modificada
** parâmetro não aplicável por não se realizar ensino de biópsia excisional, pelo que não será utilizado na avaliação.

Os resultados serão comparados com recurso ao programa IBM® SPSS® Statistics version 26 em sistema operativo Windows 10.

Para garantir o anonimato dos dados recolhidos, será atribuído a cada participante um número, que corresponderá a uma chave, sendo toda a informação arquivada sob esse número. O investigador principal será o único detentor dessa correspondência. Todos os dados e imagens resgistados serão eliminados, após a conclusão do estudo.

Outcomes previstos

- A implementação do método de ensino através de vídeo para aprendizagem de técnicas cirúrgicas básicas é seguro e reprodutível.
- O método de ensino através de vídeo abdica da presença de tutor com experiência no gesto técnico, contribuindo ainda para autonomia na aprendizagem e na prática deste e proporcionando a possibilidade de estudo no domicílio e à distância.
- A eficiência do método de ensino através de vídeo traduzir-se-á na qualidade e na retenção do gesto técnico, que serão, no mínimo, sobreponíveis às obtidas pelo método tradicional.
- Haverá equivalência nos valores de satisfação dos dois grupos de participantes.

Calendarização

30 de novembro de 2023 a 15 de dezembro de 2023: Recrutamento dos participantes

16 de dezembro de 2023 a 15 de janeiro de 2024: Período de acesso ao Centro de Simulação para estudo autónomo por meio de vídeo

15 e 16 de janeiro de 2024: Realização das sessões com tutor e vídeo-gravação do gesto técnico.

30 de janeiro e 1 de fevereiro de 2024: Vídeo-gravação do gesto técnico para avaliação da retenção do gesto técnico

1 de fevereiro de 2024 a 10 de fevereiro de 2024: Edição de vídeos e preparação para avaliação do gesto técnico

10 de fevereiro de 2024 a 30 de fevereiro de 2024: Avaliação dos vídeos

1 de março de 2024 a 1 de abril de 2024: Análise estatística dos dados, entrega do artigo para publicação.

Financiamento

Nenhum.

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