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Video-Based Surgical Learning: Improving Trainee Education and Preparation for Surgery

Paulo Mota, MD,[*,†] *Nuno Carvalho, MD,*[*] *Emanuel Carvalho-Dias, MD,*[*,†] *Manuel João Costa, PhD,*[*] *Jorge Correia-Pinto, MD, PhD,*[*,‡] *and Estevão Lima, MD, PhD*[*,†]

[*]Surgical Sciences Research Domain, Life and Health Sciences Research Institute, ICVS/3B's, PT Government Associate Laboratory, The Clinic Academic Center, Braga, Association (2CA-Braga), School of Medicine, University of Minho, Braga, Portugal; [†]Department of CUF Urology and Service of Urology, Hospital de Braga, Braga, Portugal; and [‡]Department of Pediatric Surgery, Hospital de Braga, Braga, Portugal

BACKGROUND: Since the end of the XIX century, teaching of surgery has remained practically unaltered until now. With the dawn of video-assisted laparoscopy, surgery has faced new technical and learning challenges. Due to technological advances, from Internet access to portable electronic devices, the use of online resources is part of the educational armamentarium. In this respect, videos have already proven to be effective and useful, however the best way to benefit from these tools is still not clearly defined.

AIMS: To assess the importance of video-based learning, using an electronic questionnaire applied to residents and specialists of different surgical fields.

METHODS: Importance of video-based learning was assessed in a sample of 141 subjects, using a questionnaire distributed by a GoogleDoc online form.

RESULTS: We found that 98.6% of the respondents have already used videos to prepare for surgery. When comparing video sources by formation status, residents were found to use Youtube significantly more often than specialists ($p < 0.001$). Additionally, residents placed more value on didactic illustrations and procedure narration than specialists ($p < 0.001$). On the other hand, specialists prized surgeon's technical skill and the presence of tips and tricks much more than residents ($p < 0.001$).

CONCLUSION: Video-based learning is currently a hallmark of surgical preparation among residents and specialists working in Portugal. Based on these findings we believe that the creation of quality and scientifically accurate videos, and subsequent compilation in available video-libraries appears to be the future landscape for video-based learning. (J Surg Ed ▮:▮▮▮-▮▮▮. © 2017 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: video, video-based learning, e-book, didactic illustrations, residents, specialists, Youtube, surgery, laparoscopy, urology

INTRODUCTION

The modernization of surgery has raised new issues for the implementation of Sir William Halsted's foundational principle for residency education "See one, do one, teach one."[1,2] There are currently less opportunities to observe and learn surgical procedures due to institutional policies that emphasize operating room efficiency.[1,3,4] In addition, the advent of laparoscopy and the concept of minimally invasive procedures has increased the complexity of surgical techniques, placing higher educational and technical demands for residents.[5-7] These issues can be minimized with the introduction of outside of the operating room training aids to catalyze the development of resident technical skills.[2,3,7,8] Such aids/resources can further facilitate continuous development for qualified surgeons within the fast evolving field of minimally invasive surgery.[9]

The increasing availability of high definition recordings from the operating room enhances the authenticity of video-based learning[10] and allows residents to access procedures' videos from surgeries that would be otherwise unreachable. In addition, the use of online information sharing platforms (written or videographic), increases incommensurably the number of formative resources, as well as accelerates

Correspondence: Inquiries Paulo Mota, School of Medicine, Universidade do Minho, Campus de 4710-057, Gualtar, Braga, Portugal; e-mail: damota.paulo@gmail.com

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apprenticeship and minimizes the time invested in technical education of surgeons.[4,11,12] Currently, medical professionals have access to a multitude of training tools, from Internet access, which is now a commonplace, to portable electronic devices, that are always within reach, the use of online resources is part of the educational armamentarium.[11] Thereby, the chance of turning the traditional and individualized learning into a shared, global and collective education arises, somehow levelling the effect that formation site and respective educational opportunities can have on residents/specialists.[4,11]

Studies have shown the benefits of using multimedia tools in the learning process, specifically converting cognitive input into long-term memory, indicative of learning.[13] In fact, a randomized controlled trial concluded that multimedia-based training (beholding text, graphics, audio, animation, video, and data) can significantly improve surgical performance.[14] Additionally, multimedia-enhanced teaching also improved students' performance significantly in understanding complex temporal and spatial events.[15] Online videos are an example of multimedia tools, that alongside simulators, can effectively contribute to enhance training and provide means to relieve the time-related burden of traditional teaching methods, acting as an efficient method of passing on key perceptual and cognitive skills.[2,4,11] In this aspect, videos have already proven to be effective and useful, and it seems evident that surgeons would use them while preparing for surgical procedures.[7,11]

Specifically in laparoscopic surgery, videos can be particularly important given the unique technical nature of minimally invasive procedures, that readily lends itself to the production of audiovisual aids, which is fortuitous as visuospatial orientation and skills are not automatically transferred from the open to the minimally invasive environment.[2,4] Surgical videos also have the benefit of allowing viewers to connect remotely, learn from different surgeons, review material at any time, and, in some cases, interact with the operating surgeon.[16] In fact, video-based coaching and telementoring for training laparoscopic skills, using surgical videos' remote access feature, can enhance surgeons performance through personalized feedback and maximization of educational opportunities.[17-21]

The overall aim of the present study was to increase our understanding on how surgeons use videos to learn new, or review and update their skills. This questionnaire case study conducted in one institution in Portugal, sought to (1) portray the type of video resources preferred by surgeons, across specialties; (2) describe the mostly valued characteristics of the videos; and (3) understanding the relevance of videos to surgeons in different phases of their career experience, through comparing the reported use and usefulness of videos in general and preparation for surgical procedures.

METHODS

Selection of the Questionnaire to Be Applied to Residents and Specialists of Different Surgical Fields and its Distribution

Given the absence of fully validated questionnaires beholding the parameters of interest for this project, and having a questionnaire that was already applied to a sample from the field of medicine, an adapted version of this survey was generated and applied to residents and specialists of different surgical fields.[11] Question types included forced choice, scaled response and open-ended and versed over the kind of preparation for surgeries and after the sources and topics most valuated in a video. The questionnaire was pilot-tested with the main investigator and both supervisors, and then revised before distribution (Appendix 1).

This project was submitted to the Ethics Subcommittee for Life and Health Sciences (SECVS) and to the Ethics Committee of the Hospital of Braga (CESHB), having received a positive report by these entities. All participants assign a informed consent before participation. The confidentiality of the data, collected during the application of the surveys, was kept.

Participants

The questionnaires were distributed to participants in the 2 most recent editions of an annual "Hands-on" courses of Storz sponsored surgical laboratory of School of Medicine and Life and Health Research Institute of University of Minho versed on laparoscopy. The courses enrolled 256 trainees (both residents and specialists) from different surgical fields (Urology, General Surgery, Orthopedics, Vascular Surgery, Pediatric Surgery, Ophthalmology, Otorhinolaryngology, Neurosurgery, Gynecology-Obstetrics, and Plastic Surgery). Participants were invited to participate by email and were asked to submit their responses online. The questionnaires were applied using a GoogleDocs form, and the data were extracted in the form of a Microsoft Excel worksheet.

The participants were divided into 4 groups according to their surgical career experience at the moment: junior junior residents, senior residents (>3 years), early specialists (1-3 years), and specialists (>3 years).

Statistical Analysis

Data analysis were performed with SPSS Statistics version 23 (IBM Corporation, 2015). Descriptive statistics were presented as frequencies (n) and percentages (%) for categorical variables and medians and interquartile ranges for ordinal variables. The association between degree of learning and other categorical variables was assessed with chi-square test, or Fisher's exact test in case of violation of