

## Towards a Virtual “Global Academia of Surgeons”

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**Objective:** To explore the prospects of academic e-learning by evaluating our long-standing internet-based surgical learning program and to assess the impact of training on the presentation skills of our residents. The eventual goal is to search whether such models could be further developed by the European Surgical Association (ESA).

**Background:** E-learning has become a major educational trend particularly during the COVID-19 pandemic. For more than a decade, our academic tertiary center has released weekly video-lectures covering the entire abdominal-surgical curriculum for residents. All lessons were prepared under the supervision of specialized experts and recorded and edited by a professional film team before being released on a dedicated YouTube channel (<https://www.usz.ch/surgical-resident-lectures>).

**Methods:** To date, our channel includes 120 presentations with more than 619,000 views. We conducted a survey among online users with a medical background and tested the benefits and potential for improvements of local stakeholders to collect individual reviews.

**Results:** A total of 708 users from 106 countries participated in the survey. Continuing medical education (49%), specific questions (38%), and exam preparation (33%) were the main motivations for video viewing. The preferred topics were current guidelines (69%), latest research topics (59%), and complex surgical conditions (52%). Ninety-four percent of our local audience reported a positive learning experience.

**Conclusion:** E-learning can improve local academic training and promote the global visibility of strong academic centers. Providing free and unrestricted expertise via social media is a novel and groundbreaking opportunity that fills a global education gap by dissemination of surgical education on an unprecedented scale. Expert associations such as the ESA may adopt similar formats and foster their perception as true beacons of knowledge.

**Keywords:** E-learning, free access, surgical curriculum, surgical education, video lecture

(*Ann Surg* 2022;276:746–752)

In November 2008, US President-elect Barack Obama broadcasted his first weekly presidential address on YouTube (<https://obamawhitehouse.archives.gov/briefing-room/weekly->

address). This forward-looking decision marked the beginning of a new era of communication between the public and the White House – a warp-speed version of President Roosevelt’s famous “fireside chats” between 1933 and 1944. For the first time, the presidential address was not delivered exactly between 5 and 6 PM, but whenever anyone wanted to see it. Five years after the official launch of YouTube, this very moment equated to a historical “coming of age” of internet video. The Obama campaigns was considered extremely convincing through these powerful media-based messages, reaching the public on a previously unknown scale.

In analogy, as globalization calls for advanced education and training through unconfined access to learning resources, it has become pivotal for bricks-and-mortar universities to be able to disseminate knowledge beyond the lecture halls. Consequently, e-lectures have evolved as a key element of many universities’ didactic portfolios.<sup>1</sup> Yet, online content focusing on general surgery is still in its infancy and largely limited to unselected procedural videos of varying quality, leaving a huge gap for expert-curated quality content. In this context, for more than five years, we have published weekly video-lectures covering the entire abdominal surgery curriculum on YouTube. To ensure optimal quality, all lessons were prepared by surgical residents under close supervision of specialized surgical experts and subsequently recorded and edited by a professional film team.

From the beginning, our mission was to extend our outreach to remote learners in different regions, countries, and time zones. During the COVID-19 pandemic, the push for our online curriculum became even more evident with dramatically increasing clicks and views. As there are no comparable structured surgical curricula freely available on the internet, we found it pertinent to perform a survey among users with a professional healthcare background to collect comprehensive feedback from both online and local stakeholders and to evaluate the didactic impact of this unique and innovative educational program.

## METHODS

## Videos

Residents prepared and presented educational lectures under the close supervision of a specialized academic expert. Preparation time was at least three weeks. Topics were given to go through the complete general and transplantation surgery curriculum in about 2 years.

Each presentation was to last 20 minutes, describe standards in a structured way, include the latest research findings, and address the residents in all of this. The mention of landmark studies, their critical appreciation, and their impact on the latest guidelines were as well basic components of our lectures. Each presentation included 3 to 5 interactive questions to the residents

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The authors report no conflicts of interest.

This study is supported by the LGID (Liver and Gastrointestinal Disease) Foundation.

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DOI: 10.1097/SLA.0000000000005642

in the audience and a concluding final discussion, which was led by the supporting expert.

Real-time recording by a professional camera team was initiated in January 2017. The footage was subsequently edited. After editing the footage, the videos were also validated by an experienced surgeon in terms of their understandability and comprehensibility. To make the films easier to find, we have placed 30 tags in the background of each film that relates to the content. Each film underwent a final quality check including an accompanying text and was then published online via a dedicated YouTube channel (<https://www.usz.ch/surgical-resident-lectures>).

## Surgical Curriculum

Once a certain number of published films had been reached, they were subdivided thematically and grouped together. Thus, all films can be accessed in chronological order of release or according to their topic. Videos were subdivided into large main groups (surgical oncology, general surgery, emergency surgery) and surgical-anatomical or thematic areas [upper gastrointestinal tract (GI), lower GI, hepato-biliary and pancreatic, endocrine, hernia, transplantation].

Within these thematic groups, lectures were selected to cover as many areas as possible. After about 2 years, the lectures became repetitive, and we started to replace lectures with new presentations.

Queries from online viewers were answered either by the hospital's social media office (in case of formal concerns), or by a senior physician (questions relating to medical content).

## Surveys

### (1) Among professional online users

An online survey with multiple-choice questions was created using an online tool (SurveyMonkey, San Mateo, CA). The survey was linked to each published video with a request to answer. Access to videos was not conditional on the completion of the questionnaire.

The survey was aimed exclusively at medical professionals. At the beginning, participants were asked about the reasons for video consumption. Only professionals were then guided through the questionnaire, all other persons (patients, relatives, and other interested persons) were directed to the end of the questionnaire without answer options.

The first 3 questions were related to demographic variables, followed by 3 questions focused on a professional background including the level of education (students, residents in training, surgeons, etc.), years of surgical experience, and the size of the currently employing hospital.

The following 7 questions were aimed at preferences regarding educational videos in general, that is, motives for educational video consumption, preferred topics and individual triggers for watching specific videos. Furthermore, we asked about the preferred duration of educational videos and the frequency of video consumption over the last 3 months.

The next 6 questions were specifically focused on our YouTube channel, that is the frequency of video consumption, subscription to the channel, and whether they would be willing to purchase a channel-specific license. In addition, participants were asked about didactic details such as the final discussion at the end of each video, the definition of learning objectives, and the optimal number of questions.

### (2) Among the local audience

A second survey was directed at the local audience, including presenters and advisors. Questions to the audience focused on the overall impression, the best part of the presentation, and potential improvements.

Presenters and advisors were asked for details regarding their overall satisfaction with the presentation and whether they had enough time during preparation.

## Cost

We attempted to have a cost estimate, although part of the resources was integrated into the budget of the Department of Surgery of the University Hospital Zurich. The film crew, video equipment, and software to edit the video footage incurred therefore most of the costs.

Opening a YouTube account and creating a channel is free of charge. There are additional costs of managing the YouTube channel, such as creating accompanying texts and background tags, sorting content by topic, and answering viewer questions. Thus, we attempted to estimate the real cost of completing the full curriculum on a YouTube channel.

## Statistical Analysis

The statistical evaluation was carried out by using SPSS, version 27 (IBM Corp. Released 2020. IBM SPSS Statistics for Windows, Version 27.0. Armonk, NY: IBM Corp).

## RESULTS

Between January 1, 2017 and January 1, 2022, we released 120 video presentations on our YouTube channel. Over time, newer content has continuously replaced older videos. The allocation of all presentations to the different categories is shown in Figure 1. The videos have been viewed more than 619,000 times at this point (mean = 5163 views; SD = 8773).

### Survey Among Professional Online Users

A total of 708 healthcare professionals from 106 countries participated in the online survey. The demographic characteristics of the respondents are displayed in Table 1.

Continuing medical education (48%), targeted search for answers to specific questions (30%), and exam preparation (33%) were the main motivations for video consumption. Most respondents were attracted by the topic (70%), the title/description (41%), or previous positive experience with the channel to start watching an educational video.

Preferred contents were current guidelines (65%), latest research topics (51%), and presentation of complex conditions (47%). Rare diseases were mentioned as preferred content by 22% and descriptions of surgical procedures by 39%. When asked about the reasons for dropping out of a learning video prematurely, slightly more than a third of respondents answered that they did not receive the expected information (38%) or that the topic was incompletely covered (35%).

Most appreciated were the quality of the lectures (68%), free access to the content (67%), and noncommercial background (52%), as well as the well-selected topics (52%). Most (55%) respondents stated to benefit significantly from the usual discussion at the end of the video.

More than two thirds of the respondents (69%) would appreciate the designation of learning goals at the beginning as well as corresponding questions at the end of the video. 44% would find 3 to 4 questions per video appropriate. Every fifth

(23%) would find 5 or more questions per video superior. General use of educational videos until survey compilation is shown in Figure 2. Preference of length of educational videos is shown in Figure 3.

### Survey Among Local Participants

Between September 29, 2020 and July 6, 2021, a hospital-intern survey was conducted after each video with 26 educational videos. From 422 responses, 94% of the audience reported a good to the very good learning experience.

The quality of the presentation (52%) and/or structure of the lecture (51%) were appreciated most. Sixty-five percent rated the presenters as competent and convincing, 30% as good but not exceptional.

A better learning experience could have been achieved through more clinical research according to 46%, more discussion according to 25%, and more data and evidence according to 18% of the audience.

Most presenters (83%) reported being satisfied with their presentation and 17% were completely satisfied. Most presenters were highly positive regarding the help provided by their advisor, while 8% would have appreciated more support regarding literature search and provision of background knowledge. All presenters reported having had sufficient time to prepare the presentation.

All presenters declared to have learned a lot preparing the presentation. Half of the presenters (50%) stated that one of the best things about the presentation was refreshing their knowledge, and according to 42% the exercise to speak in front of an audience. A third said they particularly benefited from presenting in English.

According to 80% of the advisors, the best part of the presentation was teaching a colleague. Sixty percent appreciated putting the knowledge into a good format and with favor for the discussion (33%).

### Production Cost

The costs per instructional video varied between 1200 and 1400 CHF, depending on the complexity of postproduction and its duration. This amount included the film team, the equipment (hardware and video software), and the editing of the footage. Of note, there was an additional cost associated with management,

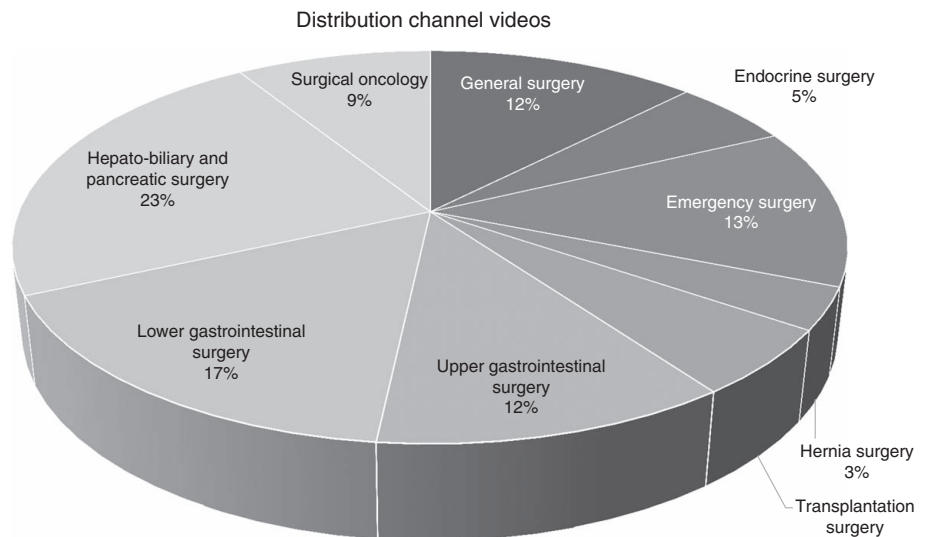
maintenance, and upkeep of the YouTube channel. We have not had, and do not expect to have in the future, any costs of such a program for speakers or experts, as this is part of our academic mission. We estimate the cost of the full curricula (2-year presentations) to be \$120,000.

### DISCUSSION

The original idea of our educational YouTube program was to develop a didactic concept to improve both local academic training and boost our residents' skills in preparing and presenting focused topics under the close supervision of surgical experts. For both objectives, it was very motivating for our residents to know that the lectures would be recorded and edited by a professional film team before being posted online. Moreover, the residents appreciated the individual support provided by experienced supervisors during preparation and made efforts to optimize and refine their presentations, for which a considerable amount of preparation was worthwhile, since the presentations were to be broadcast globally.

Furthermore, it must be said that the local language is German. While French and Italian are other national languages in Switzerland and the mother tongue of some speakers, English is a foreign language for most. All research activities including meetings are performed in English due to the international background of the teams. Therefore, English was not a major obstacle, but undoubtedly an extra effort with the benefit of training for presentation at an international meeting. The overwhelmingly positive feedback and the high satisfaction rates from both online and local audiences confirm our impression that our didactic concept was indeed a success.

In industry, job satisfaction has already been extensively studied and large companies pay a lot of attention to knowing the distress and motivational factors of their employees.<sup>2,3</sup> In surgery, it has been shown that trainee satisfaction is highly dependent on how much time is spent on training and how comprehensive the curriculum is.<sup>4</sup> Moreover, studies have shown that poor training conditions are the main reason for dropping out of a surgical career.<sup>4,5</sup> Accordingly, it can be concluded that support and, above all, strengthening of self-confidence in young surgeons have a reinforcing effect on the pursuit of their career;



**FIGURE 1.** Content affiliation of the presentations. Allocation of all presentations to the different categories. USZ indicates University hospital of Zurich, Switzerland.

**TABLE 1.** Demographics of survey respondents

Demographics	Distribution (n = 708), n (%)
Age (y)	
< 25	186 (26.3)
25–30	201 (28.4)
31–40	168 (23.7)
41–50	46 (6.5)
> 51	69 (9.7)
Missing	38 (5.4)
Sex	
Male	413 (58.3)
Female	255 (36.0)
Missing	40 (5.7)
Profession	
Medical student	237 (33.5)
Surgical trainees	110 (15.5)
Certified surgeons	162 (22.9)
Physicians, not surgeons	81 (11.4)
Missing	118 (16.7)
Surgical experience (y)	
< 5	433 (61.2)
5–10	80 (11.3)
11–20	33 (4.7)
> 20	46 (6.5)
Missing	116 (16.4)
Hospital working at	
University hospital	159 (22.5)
Regional hospital	118 (16.7)
Central hospital	110 (15.5)
No surgeons	220 (31.1)
Missing	101 (14.3)

and a good learning relationship is one of the top factors for job satisfaction.<sup>6</sup> We have seen in our project that knowledge sharing is not only a reinforcement for the residents, but also for the advisors. They find it highly satisfying to share knowledge and to be able to pass it on directly to a younger colleague.

In a second step, the project turned to a broader goal. The videos were viewed worldwide and surgeons from all continents commented on them, asked questions, and offered criticisms or praise. While we were also somewhat surprised by the global scale, this triggered further considerations. In the archetypal

academic world, experienced surgeons share their knowledge through *ex cathedra* lectures or discussion of cases, as well as performing complex operations. Trainees are expected to listen and watch for the first few years. This may be in several centers a change of paradigm in the mission of teaching.

Achieving worthwhile results at work is associated also with the highest satisfaction rates among surgical chairs.<sup>7</sup> Innovation and professional success are related to high satisfaction,<sup>7</sup> and even if these are individual definitions, the successful transfer of knowledge can be counted as such according to the results of our survey. For young board-certified surgeons, the connection to science has turned out to be a factor for job satisfaction, and for residents, a good learning relationship and stringent training.<sup>6</sup> It seems as if these factors are mutually reinforcing each other when passing on knowledge with the inclusion of the latest research results.

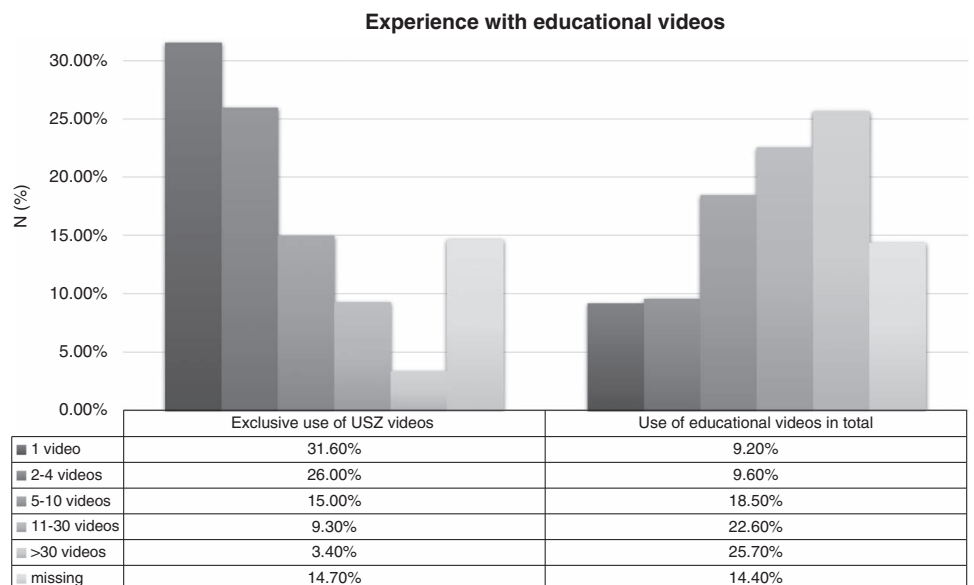
Mainly younger colleagues watched the lectures, like at a classical university. The preparation of guidelines, the latest scientific findings and complex clinical pictures are the preferred contents of the lectures. This is quite conceivable, as the presentation of these contents involves the most preparatory work, and the easy-to-understand preparation saves a lot of time and effort or can put what is difficult to understand into a comprehensible context.

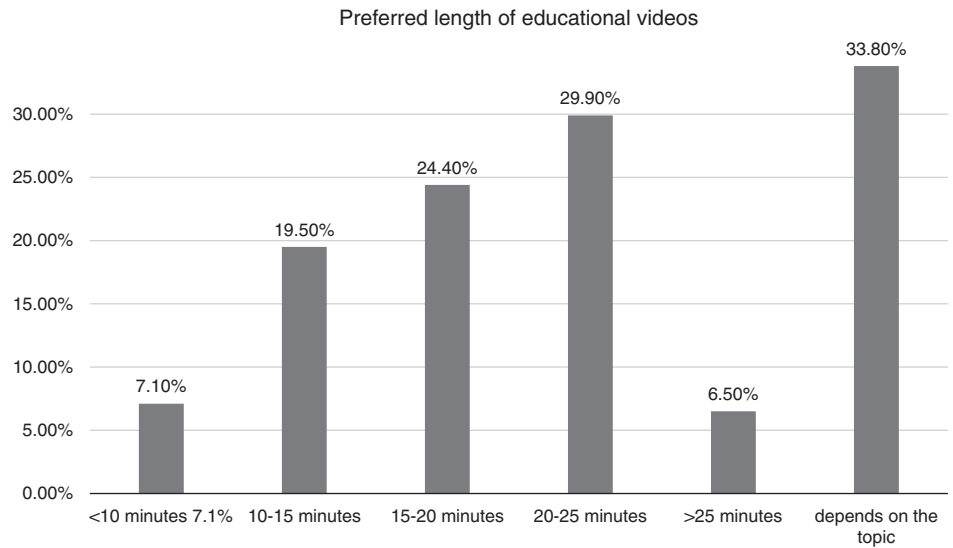
Furthermore, more than 90% of respondents indicate that they would like to see the learning objectives at the beginning and then be able to do their own review and self-assessment of what they have learned by being asked questions at the end (data not shown). Although not included in the original version, these 2 additional features would make the videos even more interesting and help viewers acquire what they see as active knowledge.

One of the most striking observations about the survey is that, contrarily to popular belief, presentations do not necessarily have to be short to be seen. Rather, many viewers consider a length of more than 15 minutes to be optimal. Equally interesting is that the majority would like to see a quiz on what they have learned.

Teaching and learning have changed considerably over the last decades, with a constant shift toward more independent and

**FIGURE 2.** General use of surgical educational videos. General use of educational videos until survey compilation. USZ indicates University hospital of Zurich.





**FIGURE 3.** Self-estimated preference for the length of educational videos by surveyors. Preference of length of educational videos.

individualized learning pathways.<sup>8</sup> In this context, the broad introduction of e-learning concepts has revealed unprecedented potential and unforeseen opportunities. Thus, during the COVID-19 pandemic, it was an important lesson that the shift from face-to-face classes to virtual classrooms and webinars did not lead to a noticeable reduction in learning quality,<sup>9</sup> and consequently, there are strong predictions that e-learning will persist as an important educational tool in the postpandemic world.<sup>10</sup>

Furthermore, experts predict that future e-learning concepts will evolve away from what is commonly called “blended learning”; that is, from providing support or supplement to standard lecture-hall-teaching.<sup>11</sup> Rather, with the introduction of sophisticated educational technology such as augmented reality<sup>12</sup> and learning management systems,<sup>13</sup> the odds are overwhelming that e-learning will become the didactic gold standard at many universities – both for basic learning content and extended curricula. In addition, the advent of e-learning will be further fueled by the recent trend to “academize” former apprenticeship professions, which resulted in an imbalance between the need for academic mass education on the one hand and limited personal and financial resources on the other.<sup>14</sup> In this context, the consequent implementation of e-learning concepts and online curricula has the potential to keep this imbalance at an acceptable level by reducing the financial impact of “attendance teaching” and reserving human teaching capacity for individualized didactic support. Therefore, in a few years’ time, how knowledge is imparted at universities will very likely

change radically. Traditional lecture-hall-teaching may then be considered an outdated luxury, reserved for a minority of students that need individual support or still able and willing to afford it. We are convinced that this evolution is unavoidable to safeguard universities as a location for education and science.

In analogy, the fundamental shift of pedagogic concepts will undoubtedly affect the way medical specialists will be trained in the future. In this regard, our e-learning initiative has a pioneering function as the first comprehensive, expert-curated academic surgical curriculum freely available on the internet.

The dissemination of knowledge is traditionally the task of universities. Increasingly, however, (professional) societies are also taking on this task, especially since only they have the knowledge in the practical area, while universities are responsible for theoretical knowledge. When academic institutions such as university hospitals prepare and disseminate knowledge, this is the ideal combination of theoretical basic knowledge and practical application at the highest level. It may simply be the next step in academic commitment to offer globally the knowledge that has accumulated in richer parts of the world.

Considering our channels’ increasing activity, it may be a great opportunity for national and international surgical societies like the European Surgical Association (ESA) to adopt similar formats to create a novel type of “virtual surgical academia.” We have summarized what we believe to be the key factors for success in Table 2. We would speculate that the unique combination of the ESA’s academic and professional excellence with state-of-the-art educational online technology

**TABLE 2.** Key Points for Success

Key Points for Success	Benefit for Residents
Definition of a comprehensive surgical curriculum to be delivered over a 2-y period	Reliable collection of topics
Task for the respective residents for searching and preparing up to date literature review and presentation	Independently search the literature and place the latest data in context
Supervision by an established expert covering preparation, presentation, and importantly defining the learning objectives	Assurance for the assistant that errors are detected and corrected in time before the presentation and that comprehension questions can be answered early on
Interactive presentation with 3–5 questions asked by the presenter to test the knowledge of the audience	Actively involving and not just passively listening of the audience
Length 15–20 min, 10 min additional discussion	Requirement to present complex topic in a clear time frame
The expert opens the discussion at the end of the presentation	



has the potential to become an important addendum to local teaching in many institutions. By integrating cutting-edge, first-world healthcare expertise into official surgical curricula, such an initiative may also play a key role for the surgical education of residents – particularly in developing countries.<sup>15</sup> A big difference of our educational channel to other existing services is that the access to our program is completely free of charge and without any access restriction. This allows also addressing surgeons from countries with a smaller financial scope. We thus build a unique bridge between a strictly quality-controlled, evidence-based academic background and completely unrestricted access.

In contrast, other websites are generally designed to suit the needs of trained and qualified surgeons looking for specific surgical techniques. Individual technical tips and tricks and specific surgical steps could have been interesting too, but were from the beginning beyond the scope of this project in its current form.

If the costs are borne by a renowned institution and several universities, they are also kept within reasonable limits. However, the resources needed to set up and maintain such a project must also be considered. Outstanding professional and scientific standard is a prerequisite for success and only achievable through strict quality control of the published material. Therefore, extra expenditures for a professional revision of the content before being published will be required. In addition, accompanying texts and tags must be prepared and added for easy retrievability through search engines. Assuming an overall expenditure of roughly 1000 Euro per published video, the cost for a complete surgical online curriculum on a dedicated YouTube channel may amount to 50.000 to 100.000 Euro. Nevertheless, by concentrating all competence in the same hands, we are convinced that scaling effects could keep expenses at a much lower level.

In conclusion, in this increasingly interconnected world, the demand for online education is going to thrive in the future. The brisk activity of our educational YouTube channel and the positive internal and external feedback indicate a strong demand for customer-friendly, comprehensive, up-to-date, and globally available surgical curricula. Our specific format catalyzes the residents' preparation and presentation skills, which goes far beyond traditional in-house training, and we are convinced that our initiative fills a worldwide educational gap, of which the potential is not yet realized. Adopting, developing, and refining a "virtual surgical academia" may promote the global visibility of international surgical societies as the ESA to an unprecedented scale.

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## DISCUSSANTS

### Ricardo Robles-Campos (Murcia, Spain)

I would like to congratulate the authors for their excellent work and forward-thinking initiative. The recent introduction of e-learning concepts has revealed novel and unprecedented potential, as well as unforeseen opportunities – very similar to the surgical-technical changes we are continuously witnessing in the operating theater. The World Wide Web has fundamentally changed how people communicate and businesses operate, and it will unquestionably change how future students and residents are trained and taught.

In this regard, the success of Zurich University Hospital's educational YouTube channel is truly inspiring. I am convinced that there is a unique and timely opportunity to initiate a similar program under the patronage of the European Surgical Association (ESA). Given the academic and professional excellence of the ESA, such an initiative could have the potential to become a major player in online surgical teaching and learning. Therefore, I would like to know your thoughts on the following questions:

My first question relates to the kind of professionals interested in the channel. The knowledge and use of visual material are not the same for general surgeons as for other medical specialties, such as nursing or medical students. Do you think that the heterogeneity of the participants in the questionnaire could affect its interpretation and results? Also, in the external validation of the users of the channel, a "yes or no" response system has been used. Do you think another type of scale, such as the Likert scale, which allows us to ascertain the degree of agreement or disagreement with statements, would be more appropriate for this study?

Second, what would be the first step to efficiently initiate such a "virtual academy" under ESA patronage? In the first instance, I think that an organizing committee, which would be responsible for building the internet site, selecting and coordinating the contributing experts, and controlling the quality of the content that is published, would need to be set up.

Finally, in your paper, the budget has been analyzed. If we were to propose an "ESA Virtual academy," which you commented on in the discussion part of your paper, we must be aware that there will be a substantial cost and organizational overhead to set this up, as well as to administer and update the

online content. What are the expected operational expenditures, and how could such a project be funded (e.g., industry, pay-per-view, subscriptions)?

### **Response from Karoline Horisberger (Zurich, Switzerland)**

Thank you very much, Professor Robles, for your kind comments and questions. Your first question regards the heterogeneity of our online audience. Our YouTube channel is free, and therefore, it can be watched by anyone with an internet connection, regardless of motivation and professional background. However, we asked all participants in the questionnaire about their reasons for viewing our channel, specifically focusing on the respondents' professional backgrounds, and whether they are patients or relatives of patients. Only medical staff and students were then guided through the full questionnaire. Nevertheless, we fully agree that the participants in the questionnaire are still a heterogeneous group, which might influence the results. Nevertheless, we were able to distinguish between different groups by asking further questions on gender, work experience, hospital size, etc., and thus, were able to allocate the answers accordingly. Your next comment targets the design of our questionnaire, specifically, why we did not use Likert-type answering options. However, we mainly asked multiple-choice questions, in addition to only a few yes/no questions. We are aware that Likert scales are well-established instruments to scale answers from surveys. They, nonetheless, have some considerable drawbacks because the scaling of the response options is not equidistant. Our questions were qualitative rather than quantitative, which we think is necessary when an offer is new and you want to gauge what, rather than how much, people appreciate and dislike about it.

Regarding the requirements to initiate a "Global Academy of Surgeons" under ESA patronage, we agree that the first step should be to set up a steering committee and to clarify the basic principles of the concept. From our experience, it became clear that strict quality control of the published content is pivotal for a positive user experience, which, in turn, is the best predictor of continued channel subscription and a low drop-out, or "churn," rate. This means that we must start by selecting experts in the field, who can guarantee high-quality content from the onset. Based on its solid scientific and educational background, the ESA would certainly be a logical platform for such projects.

It is also worthwhile to optimize the content for mobile use. On a worldwide scale, this is certainly the most popular media through which such educational videos are viewed. There are also questions, such as whether these videos should be shown on YouTube or via an app, but they can be answered with the help of a professional organization.

Finally, we have estimated the cost for a complete surgical curriculum, including filming and editing, to be around 1200 euros per video clip. We are convinced that free and unrestricted access to our content is a prerequisite for attracting a global audience. Therefore, financing must come from external sources, perhaps, through industry sponsors or a foundation.

### **Inne H.M. Borel Rinkes (Utrecht, The Netherlands)**

Thank you, I enjoyed your presentation. I have 2 very practical questions. First, as a routine, did the resident, who was giving the talk, not only prepare it but also practice it with the supervisor? Second, I saw that only 10% of the centers and supervisors were proud of their presentations; does that simply reflect Swiss modesty?

### **Response from Karoline Horisberger (Zurich, Switzerland)**

Thank you, Professor Borel Rinkes, for your questions. First, there was no routine test run for the resident lectures and the complete preparation process was at the discretion of the presenters. We, however, regularly organize full-day courses on "how to perform as a speaker", where residents are trained on a voluntary basis. Second, regarding the satisfaction of our residents with their presentations, we honestly don't know the reason for such a low rate. I assume that they are highly self-critical and maybe just underestimating their performances.

### **Mickaël Lesurtel (Clichy, France)**

Congratulations. I have a short question. As you said, quality control is key. It could be interesting to know the percentage of videos that you removed or chose not to publish due to poor quality. Do you have information on this?

### **Response from Karoline Horisberger (Zurich, Switzerland)**

There was only one case where a complete video could not be published because an expert from another department failed to be anonymized before going online. In addition, older videos are routinely replaced with newer versions on the same topic, which usually occurs after 2 years.

### **Christiane Bruns (Cologne, Germany)**

How about the data protection laws? Did everyone sign a data consent form, as this can often be difficult?

### **Response from Karoline Horisberger (Zurich, Switzerland)**

No patient data have been published, and residents must consent to being shown on the internet following local and international laws.