Online Resources in Pediatric Surgery: The New Era of Medical Information

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Abstract

Tele-education has the potential to facilitate rapid sharing and dissemination of current research and knowledge among pediatric surgeons around the world. Classically, the exchange of surgical research occurred via national surgical conferences, articles published in peer-reviewed journals, and textbooks. The advent of Web 2.0 and the rapid pace of technologic advancement have allowed knowledge, education, and research to be exchanged online. Virtual symposiums act as online conferences where participants present and debate new research and surgical techniques in real-time web meetings. Resource libraries allow up-to-date information to be archived and viewed at the user’s convenience, bypassing the need to wait long periods for paper publications. Tele-education allows pediatric surgeons to connect and share ideas around the world, while saving time and money.

Keywords
► pediatric surgery
► tele-education
► virtual symposium
► webinar

Introduction

Traditional surgical training has consisted of a teacher, lectures, and hands-on experience continued through decades of ongoing learning. The Halstedian method of manual operative skills training with exposure to graduated surgical practice still remains the mainstay of training. Textbooks and journal articles have long been the primary method of self-directed learning. However, the information in these resources can be up to 5 years out of date because of the slow publication process. Physically attending conferences gives access to current information, but the required travel, fees, and time away from work is costly.

To provide current education, the Internet has become the most useful tool available, almost more than textbooks, among those who practice pediatric surgery. The broad reach of this resource allows surgeons to decrease expenditure, spend less time away from work, and stay educated on up-to-date knowledge.

We believe that the key to improving pediatric surgical care in developing countries and modern health systems lies in the appropriate application of technology. Tele-education is one avenue in the increasing incorporation of technology in education. The application of tele-education can improve pediatric surgical care by strengthening education for general surgeons who treat children at the community level. It can also improve education for pediatric surgery trainees, who often rely on outdated versions of textbooks or articles in scientific journals that do not provide technical instruction.

Finally, tele-education can improve the abilities of practicing pediatric surgeons by providing live and interactive teaching that overcomes previous shortcomings, such as the high cost of travel necessary for surgeons to travel for postgraduate training. In this article, we review the evolution of tele-
education, its use in improving pediatric surgical care, and current online resources available to surgeons.

**Review of Tele-Education and Web-Based Education**

Tele-education has its roots in the 1960s when universities began to use radio, television, and video for supplemental material. With the advent and rapid evolution of the Internet, the speed of communication began to increase. As the use of e-mail, instant messaging, and video communication increased, so did the ability to interact in a live manner. In the past decade, Web 2.0 and high-speed Internet have facilitated tele-education, with the use of Webcams and voice-over Internet protocol software, such as Skype, allowing inexpensive and accessible tele-education.¹

One example of modern tele-education is teleconferencing. The teleconference allows for interaction, including audio and video, and possibly other modalities, between at least two sites.² Augestad and Lindsetmo reviewed the use of teleconferencing as a tool among surgeons. They found that teleconferencing had wide applications, including use among multidisciplinary oncology teams (tumor board), rural trauma and emergency settings, postoperative follow-up, and outpatient consultation. The use of videoconferencing was found to be generally acceptable by patients and physicians, cost-effective, and was able to improve knowledge gaps.³ Holland et al described their experience with using teleconferencing as a tool for education of medical students during their pediatrics clerkship at remote locations.⁴ Overall, 98% of involved students agreed that having access to pediatric surgeons at the urban hospital via teleconferencing was valuable for their learning.

Several studies in the pediatric literature have attempted to quantify the effectiveness of tele-education. Jain et al randomized staff nurses to either tele-education or classroom teaching for training in neonatal resuscitation. They found a comparable increase in knowledge and skill between the groups, with similar satisfaction scores.⁵ In a similar study by Loewen et al, health care professionals (nurses, physicians, midwives, emergency medical technicians, and respiratory therapists) were randomized to teleconference or face-to-face groups for instruction on neonatal stabilization. The increase in knowledge quantified by pre- and posttests were comparable between the two groups.⁶

Tele-education has also been used to improve surgical skills over long distances. In a study by Okrainec et al, 16 surgeons from two centers in Botswana, Africa, participated in a Fundamentals of Laparoscopic Surgery (FLS) course. Half of the participants completed the FLS under telesimulation remote training sessions with a proctor, while the other half completed the course using the FLS DVD and self-practice. The group who had remote telesimulation had significantly higher posttest FLS scores and a 100% skills pass rate compared with 38% in the self-practice group.⁷ Hadley and Mars reported on their 18-month experience with teleconferenced postgraduate medical education in pediatric surgery in South Africa.⁸ Their experience involved weekly seminars conducted by pediatric surgeons from the central teaching hospital in the KwaZulu-Natal province of South Africa, which were broadcasted to satellite hospitals for general surgical specialists, trainees, and medical officers. Survey responses indicated the teleconferences were good or excellent teaching tools and an effective alternative to attending a seminar program. The authors have further reported their experience of recording their seminars and distributing DVDs to four countries in which lack of bandwidth precludes teleconferencing.⁹

**Online Resources for Pediatric Surgeons**

There are endless resources available on the Internet for pediatric surgeons, each with their own benefits and limitations. These can be divided into two broad categories: virtual symposiums and resource libraries.

**Virtual Symposiums**

A virtual symposium attempts to accomplish online, what a surgical society conference does in person to varying degrees of success. It provides a format for participants to share research, give lectures, debate controversial topics, ask questions, and discuss new ideas using audio and video communication software. Web-based conferencing solutions such as Adobe Conect (Adobe Systems Incorporated, San Jose, California, United States), GoToMeeting (Citrix, Santa Clara, California, United States), and Skype (Microsoft Corporation, Redmond, Washington, United States) have simplified how virtual symposiums can be conducted, making it easy for participants to join and enabling content to be recorded for future use. Some of these web events mimic the classroom with a bit of interaction, while others attempt to truly recreate the passion and energy of a live world congress.

GlobalCastMD takes the webinar a step further. It is an online community resource that provides both archived video content and live-interactive online symposiums and seminars. GlobalCastMD attempts to blur the lines between broadcast television and web-based physician education by increasing the production value and interactivity of the traditional webinar model (►Fig. 1). The result is a highly interactive, less formal atmosphere that welcomes discussion, opinion, and audience participation from around the globe.

![Fig. 1](image_url) A casual atmosphere makes for better education.
These events highlight key opinion leaders’ techniques and bring focus to innovations in surgical and medical treatment options with the goal of bringing thought leaders together with those that may not usually have the access to them due to travel or cost limitations (Fig. 4). In addition, GlobalCastMD events are archived and discussions can be continued online. Membership is free and the events are extremely affordable to most.

While GlobalCastMD is a prime example of the advancement of web-based education and virtual symposiums, some surgeons in developing countries do not have or need access to the cutting-edge, advanced level of knowledge being traded during these online sessions. Many groups are attempting tele-education in resource-limited settings, as well. Access to pediatric surgeons is often limited in rural communities or developing countries, which necessitates that general surgeons function as pediatric surgeons. Dr. Numanoglu and colleagues have been conducting weekly web-based education sessions from the University of Cape Town in South Africa for the last 3 years. These live broadcasts host pediatric and general surgeons from across Africa, Asia, and the Middle East. Lecturers provide content in a seminar format, with discussion and questions presented using both chat-boxes and audiovisual dialogue. This group has broadcast 120 web

Fig. 2 Live discussion and poll questions add to the interactivity.

Fig. 3 Faculty attend from all over the world.
meetings, with only 1 cancelled broadcast because of Internet connectivity issues. Furthermore, collaboration with surgeons from Europe and North America has expanded the range topics to include subspecialty lectures such as pediatric colorectal surgery. The Cape Town webinars are also recorded, allowing content to be viewed online at a more convenient time. These recordings have been viewed over 300 times per month.

Resource Libraries
There are many other resources on the web that offer recorded symposiums or video training in a library-like format that is searchable. Many Web sites provide archived content with footage of instructional video. YouTube is one example, which provides an easy-to-use platform to share and watch surgical videos. There are also “channels” on YouTube that group content under a single organization. The Society of American Gastrointestinal and Endoscopic Surgeons, as an example, maintains its own channel and uploads video content that has been presented at annual meetings in recent years. However, the majority of the content found on YouTube is not peer-reviewed.

Videoscopy is the online complement to the Journal of Laparoendoscopic & Advanced Surgical Techniques, and offers high-quality, peer-reviewed video demonstrations of surgical techniques and technology. The effectiveness of this approach however, is limited by the cost of subscription, which exceeds $3,000 for institutional access.

WebSurg describes itself as “a virtual surgical university, accessible from anywhere in the world through the Internet.” The breadth of its content includes new and innovative scientific and technical content in general and gastrointestinal surgery, gynecology, urology, and many other specialties including pediatric surgery. Videos are available in multiple languages with English subtitles. This resource also has a special focus on minimally invasive surgery for the interested surgeon.

Finally, online resources such as UpToDate, AccessSurgery, ClinicalKey, and PubMed provide access to the latest peer-reviewed journals, review articles, and textbooks. These resources are important in providing the most up-to-date information to surgeons, given that many surgeons in developing countries and rural settings use textbooks that have been translated, in which information is often outdated by up to 10 years. Textbooks available online are updated more often as new knowledge becomes available, whereas textbooks in print often lag behind current research by several years. Similarly, peer-reviewed journals will publish articles online as they become available, whereas the same article will often be in press for up to 1 year before it becomes available in print. These resources generally lack video content, but often have appropriate and high-quality illustrations. However, while these resources provide information on the latest basic science and clinical research, they often do not have step-by-step technical information that can be used by a surgeon to learn a new procedure. Another factor limiting access to these resources is often the expensive subscription costs.

Advantages and Alternatives
The advantages of web-based education should be immediately obvious to the user. The ease of access and the reduced or nonexistent cost of web-based education are the greatest advantages that make its global use possible. Virtual symposiums further allow the exchange or debate of ideas in real time. This format further has the advantage of engaging participants from different regions and countries in a virtual face-to-face conversation that is otherwise possible only once a year at a national or international conference.
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While web-based education has the ability to connect surgeons in real-time, it does have limitations. Slow Internet connectivity in rural areas is the major drawback to tele-education. However, the availability of high-speed Internet through telecommunication networks continues to expand throughout the world, allowing many remote area users to have access to online resources. Furthermore, virtual symposiums require a set date and time for each participant to log into the meeting. This limitation, though a true obstacle in some occasions, is relatively minor when compared with the alternative, which requires paying for travel, registration, and hotel fees to attend a conference in a similar manner. Finally, virtual symposiums lack the face-to-face interactions that would be found at a conference or society meeting. While this essential interaction is lacking in web-based education, most virtual meetings and symposiums allow participants to broadcast videos of them while seeing the other participants.

Conclusion

As medicine has evolved substantially over the last decade so has medical education. Historical methods of acquiring new knowledge in health care including textbooks, medical conferences, or journal articles, had disadvantages. The primary disadvantage was timeliness. Content from textbooks is usually considered to be 5 to 10 years old by the time it is in the hands of the reader. National conferences are great way to obtain current information but may not be practical from a financial or time efficiency standpoint. That is why, recently, more and more pediatric surgeons are obtaining information from the Internet. As described earlier, many Web sites are now available to provide static and dynamic information to practicing pediatric surgeons. Over the years, this will likely evolve rapidly as more robust and effective teaching material will be made available to practicing pediatric surgeons. Also, as live conferences become more frequently available online, we must rethink the format. Traditional webinars will not keep the attention of the viewers for prolonged periods of time. These must be as highly engaging and entertaining as television. Without a doubt, the new era of medical education will harness the power of the digital age.

Disclosures

S. R. and A. N. have no disclosures. T. A. P. is founder and owner of GlobalcastMD. M. S. is an employee of GlobalcastMD.

Conflict of Interest

None.

References