Technology continues to influence the delivery of education. Public schools are increasingly integrating technology into standard curriculums by using such things as tablets and computers as well as smartphones in the classroom, digital books, social media to confer between classroom and home, and virtual classroom programs that allow children to have a more “realistic” experience learning about various topics. A subset of today’s children will become the next generation of orthopedic surgeons; the use of technology in their education and training will be paramount. Although traditional textbooks remain a suitable option for obtaining basic information on epidemiology, etiology, and surgical techniques, technology is expanding more rapidly than traditional print can keep pace with. Modern surgical education needs to expand beyond textbooks and print to keep residents engaged in their learning and training.

Currently, orthopedic residents watch surgical videos not only to obtain basic knowledge but also to learn how to perform various procedures, institute follow-up protocols, and manage complications. Streaming video services on modern web networks have allowed videos, which were previously confined to bulky and inconvenient stationary machines, to become mobile. Residents can readily access surgical videos essentially anywhere there is a WiFi or cell phone network—in the operating room or in the call room between cases, at home, or on the train. They can view a video 5 minutes prior to a surgical case and still appear prepared once surgery begins.

With the current exponential use of multimedia making educational content more convenient compared with traditional textbooks, older orthopedic surgeons have expressed concern that residents do not read enough. However, is this necessarily a bad thing? Individuals may retain only approximately 10% to 15% of what they read, 10% to 20% of what they hear, and 20% to 30% of what they see.1 Plus, an old surgical adage cannot be forgotten: “See one, do one, teach one.” With surgery being so visually based, it seems obvious that video media should be a mainstay of surgical education. However, where should surgeons, especially those in training, “see one?” Rapp et al2 surveyed general surgery residents, faculty, and fourth-year medical students from a large academic medical center. Ninety percent of those who responded to the survey across all groups (including faculty of various ages) used surgical videos to prepare for surgical cases. When videos are properly standardized and reviewed by appropriate faculty, education via this means can lead to decreased errors by surgical residents and less surgical takeover events by staff.3 Watching instructional videos prior to participating in a surgical procedure may shorten a trainee’s learning curve, leading to improved patient safety.4 Orthopedic surgeons should encourage the use of multimedia in education as adjunctive training tools that can be successful in instructing and engaging residents and trainees. However, in doing so, they must realize that this content requires assessment and evaluation to ensure that it provides appropriate information.

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Orthopedic residents can access a variety of Internet video platforms, including VuMedi and YouTube. With the advent of wearable intraoperative camera equipment such as GoPro, surgeons can become cinematographers and offer their perspective to the world. Video editing programs such as GoPro Quik and iMovie are user-friendly, having simple instructions for producing videos. YouTube was the video source most commonly reported by responders (86%) in the study by Rapp et al. Although some reliable content can be found on sites such as YouTube, this information has not necessarily been reviewed for completeness or accuracy. This is especially true of surgical technique videos. Sites such as VuMedi allow users to add any video into their libraries with little oversight regarding the content. The same is true of the popular orthopedic website Orthobullets, which also has a section of orthopedic videos. Many of the videos on VuMedi and on YouTube are of lectures and thus do not necessarily qualify as “surgical” videos. Numerous orthopedic surgery vendors also provide smartphone and tablet applications that contain live action and computer-animated surgical videos. Although these are of excellent quality, they must be used cautiously given the industry sponsorship. Current orthopedic surgical textbooks often have accompanying videos.

Greater oversight, including standardization and peer review, is necessary to validate the incorporation of videos into surgical training. This task is challenging due to the multitude of techniques described for any given surgery, the emotions surgeons have attached to the techniques that they use most, and the sheer number of videos, even on orthopedic-specific websites, posted. How should surgical videos be reviewed to ensure their accuracy and quality? What sources are reliable for providing quality videos? Rapp et al noted a discrepancy in the use of higher-quality videos. They found that surgical residents/learners were more likely to access videos on YouTube, whereas faculty surgeons accessed more reliable sources such as society webpages and commercial videos. Various questionnaires can be used when assessing the quality of video content, including the DISCERN criteria, but these are focused on videos in the general sense and have been used mostly for medical content aimed at the general public rather than surgeons. Currently, no validated questionnaires are available to assess the quality of surgical videos. However, reliable video resources do exist for residents and attending surgeons alike to use in practice.

The American Academy of Orthopaedic Surgeons offers a good template for video review via the Orthopedic Video Theater (OVT) video selection criteria. All videos are peer reviewed by 2 or more rotating committee members. Each video must meet strict established requirements to ensure its clinical accuracy and video/audio quality. Although once offered as a separate, paid feature, OVT content is now available free of charge to all American Academy of Orthopaedic Surgeons members, including resident members. A wide range of types of video are available, from basic surgical technique videos to more robust videos of techniques accompanied by procedure outcomes. New content can be submitted throughout the year. The OVT committee chooses the best videos of the year (“award winners”) for the annual meeting. Subspecialty societies have followed suit by rigorously peer reviewing videos and adding content to their websites available to their respective members. Some subspecialty societies, such as the Pediatric Orthopaedic Society of North America, have begun incorporating multimedia submissions for presentations at their annual meetings. Besides the OVT, a myriad of other orthopedic surgical video sites were evaluated by Serino and von Keudell. They used the American Academy of Orthopaedic Surgeons OVT submission criteria to tabulate an aggregate score for each video site, including MedlinePlus, YouTube, and VuMedi. As would be expected, they found that video value, quality, and volume varied widely among the available surgical video libraries. With all reviews of video content, points are arbitrarily assigned to the criteria, so there is great subjectivity. Surgeons at different levels of training (ie, resident vs attending) may appreciate different aspects of a video. Thus, surgeons will vary regarding which videos they find most useful for their particular practice.

As more multimedia sites become available, to ensure that residents and attending surgeons are receiving quality education from surgical videos, the next step for the orthopedic community at large to consider is the development of a formal orthopedic video journal. This would need to be vigorously peer reviewed with a required specific structured format similar to orthopedic print journals. To ensure its success and adequate author input, such a journal would need to be cross-referenced within medical journal databases such as PubMed and Medline and accepted as part of the “literature.” Video categories could include specific studies on operative techniques and reviews of basic surgical topics, thus providing information for surgeons at all levels. The American Academy of Orthopaedic Surgeons has started leading the way for this approach by printing abstracts of the annual award-winning videos received by the OVT in the Journal of the American Academy of Orthopedic Surgery. Although this covers only a small number of the available videos, it is another way for both academic and non-academic orthopedic surgeons to provide meaningful contributions to the literature in a multimedia form. Standardization will ensure that quality videos continue to be produced and that all practicing surgeons receive maximum benefit from them. This will contribute to the development of the best available evidence for use in the care of patients.

Apart from orthopedic residents, another category of surgeons who would greatly benefit from high-quality surgical videos are those practicing in the developing world. Widespread networks and micro-sized multimedia storage have allowed the developing world to access first-world resources in the form of surgical mul-
timedia, including quality high-definition video. High-quality multimedia education will benefit our international colleagues, and little funding will be necessary to bring them quality video content. As ongoing partnerships continue to develop among the international orthopedic societies, multimedia can be shared and compared in a bilateral way. Surgeons from different parts of the world and from different cultural backgrounds can learn from one another, with benefits received by all.

Much work remains to be done to ensure that surgical video content is standardized and beneficial for all classes of surgeons to use in practice for education and case preparation. It is a tool that will continue to be influential when learning the trends and techniques of current orthopedics. Surgical multimedia is indispensable for educating surgeons around the world, and its use and development by residents and faculty alike should be encouraged.

REFERENCES