Avail

WHITE PAPER

Livestreams from the operating room fill medicine's education gap

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The demonstration of live procedures is essential not only to the education of future and current medical students, residents, and fellows, but to the continuing preparedness of licensed physicians and the medical device industry, as it provides essential product and technique information. In mid-March of 2020, however, many teaching venues went dark as the COVID-19 pandemic struck, eliminating crucial opportunities for members of the medical community to learn necessary skills.

At a time when there was a heightened demand for doctors able to treat patients who had the virus while continuing to advance care in their areas of specialty, medicine was facing a clinical education crisis. Yet, the crisis was not new: In the preceding decade, a shrinking pool of resources had increasingly interfered with the teaching of procedural medicine.[1,2] Moreover, the factors that shaped this shortage are expected to remain in play indefinitely.

Fortunately, even before the pandemic, a solution was emerging that allowed health systems to skirt those obstacles as they forged ahead with coursework for residents, fellows, established physicians, and medical device field representatives that demonstrated the intricacies of surgical techniques and the applications of new equipment and enabled highly collaborative clinical engagement. Livestreamed broadcasts from the procedure room were found to be not only a swift and effective teaching tool across disciplines, but in many cases superior to on-site observation because they provided unobstructed views—and to countless people simultaneously. Nevertheless, it was not until the pandemic hit that the technology began to move toward widespread adoption across hospitals, ambulatory surgery centers (ASCs), and other medical settings. Having adapted out of need during a challenging moment in history, the healthcare system is now continuing its evolution toward a more efficient and effective teaching standard that, ultimately, will support a higher caliber of patient care.

"A crucial component of that transformation is simple, accessible yet advanced technology that allows medical learners to view surgeries in real time and at close range from anywhere in the world," said Avail Medsystems CEO Daniel Hawkins. "Seeing the need to drive efficiencies in surgery, we developed our innovative livestreaming system well before the COVID-19 pandemic. Now, as the medical field adjusts to next-level

expectations about how collaboration can be accomplished, we are supporting the rapid adoption of this platform designed to securely stream procedures from the operating room to the iPads or computers of physicians, surgeons, students, and medical-device representatives."

With high-definition, high-powered video cameras and inputs for surgical imaging housed in a mobile console that can be easily wheeled throughout a hospital, the Avail System allows remote users to "join" a procedure, view it from different angles and distances, monitor imaging, and communicate and interact with the operating practitioner. To maximize the reach of those broadcasts, viewers can share their screens during procedures.

Adopted by leading academic hospitals, ASCs, office-based labs and Tier 1 medical device companies, Avail's approach bolsters the clinical education landscape by offering the immediacy of on-demand learning, the promise of connectivity to expertise, and an unlimited scope of opportunity for collaboration.

"The Covid-19 pandemic necessitated the development and adoption of sophisticated digital education platforms to assure continued procedure-based training of physicians at all levels, from students to practicing doctors," said John H. Rundback, MD, a managing partner with Advanced Interventional & Vascular Services in Teaneck, New Jersey, and partner with NJ Endovascular and Amputation Prevention. "The Avail System provides a unique and high-resolution platform that we have used to successfully navigate these educational challenges. As we move forward, the quality and adaptability of the Avail suite may likely become the 'new normal,' with a permanent impact on the way that procedural learning is offered, overcoming the inherent difficulties of in-person training including time restraints, travel, and tighter regulations in ORs and angiography labs."

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Identifying Challenges

This technology is particularly valuable at a time when the pool of medical students is constantly growing—despite the number of teachers remaining static.

While the number of first-year medical students in the United States grew by 50% to an annual 28,000 between 2002 and 2018, the numbers of third-year clerkships and preceptors remained unchanged due to medical institution mergers, shorter hospital stays, a shifting of outpatient procedures away from hospitals and into modern ambulatory surgery centers, and a concern on the part of health systems that teaching would negatively impact their productivity.[1,2] These issues, along with a drop in resident work hours,[3] are expected to present long-term obstacles for students seeking live procedural experience after completing their preclinical studies.

Not surprisingly, learning opportunities for medical students shrank even more during the COVID-19 pandemic. With students considered nonessential personnel and thus largely barred from entering teaching hospitals, clinical clerkships were put on hold or continued remotely. During that period, a drop in the number of elective surgeries further restricted learning opportunities.[4]

Practicing physicians faced similar restrictions when it came to obtaining continuing medical education during the pandemic. With the gathering of groups restricted by hospital systems and professional associations, opportunities for observation of live surgeries dwindled, as did other peer-to-peer activities such as grand rounds, lectures, and case discussions.

This launched an ongoing conversation[5] about how to make these activities more wide-reaching and inclusive going forward—as did the abrupt transition of medical conferences to a virtual format in 2020. Looking ahead, 74% of attendees want scientific meetings to permanently remain at least partially virtual, according to the results of a reader survey published in the journal Nature.[6] That means solutions will be needed about how best to share conference programming, including the broadcast of live procedures.

Medical technology companies also felt the effects of pandemic-era limits on live operating-room observation, collaboration, and new-technology education, and those concerns were compounded by a longer-standing obstacle, the tight schedules of their field representatives. As a result, those companies are exploring longer-term digital solutions[7] such as the Avail System, which can enable field representatives to “sit in” on surgeries from wherever they are, either to learn about anatomy, procedures, and the potential applications of new devices or to provide in-the-moment guidance to doctors about how to use those tools.

"We don't think of the Avail System strictly as a pandemic solution; we look at it as an essential collaborative tool for the long term."

—Bill Nicholson, MD

"Collaboration with industry is critical to the advancement of healthcare and the innovation of more effective and minimally invasive devices," stated Alexander Coon, MD, director of Endovascular and Cerebrovascular Neurosurgery at Carondelet Neurological Institute, who utilizes Avail technology to lead virtual training sessions for device representatives at a Tier 1 medical device manufacturer. "I work every day alongside the device industry, and Avail has made it easier to do so. The efficiencies that Avail affords are now part of our everyday life, and industry can utilize this easier and immediate access to training to more quickly introduce new products and support its physician customers."

Forging Solutions

Relying on live broadcasts from the operating room as a means of overcoming these barriers is not a novel concept; for years, health systems have hired camera crews to do just that. But that strategy is challenging due to its cost—between $20,000 and $30,000 per case—along with the lead time needed to set up such filming and the fact that it brings nonessential personnel and a lot of equipment into sterile hospital settings.

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Even before the pandemic, there was a much more cost-effective—if less often utilized—option: livestreaming procedures with in-house equipment that is simple to operate, does not require a camera crew, and allows the option of creating procedural video libraries.

"Avail, which began offering that product option in 2019, has equipped our team to broadcast multiple cases a day cost-effectively without adding any foot traffic to procedure rooms

and without hindering the workflow or the movements of the support team in the operating room," said Phil Taussky, MD, section chief and chief value officer of the Department of Neurosurgery at University of Utah Health.

Livestreamed procedural education proved beneficial in a 2017 study of 365 medical and dental students who attended interactive, surgical demonstrations that were broadcast live and moderated by an anatomist—in addition to a standard dissection course. Those who attended the livestreamed demonstrations did significantly better on a final exam than those who took the dissection course alone.[8]

Furthermore, in 2014, a survey of 253 urologists found that respondents considered livestreamed video of a procedure during a conference more valuable than edited or unedited case videos because of the opportunities to ask questions and watch an entire unabridged procedure.[9]

Livestreaming of medical procedures proved to be a valuable educational tool during the COVID-19 pandemic, as well.

In a pandemic-era study, the University of Kansas Hospital found that livestreams of surgical procedures "achieve(d) active learning for students and residents as opposed to passive learning such as watching a previously recorded video or listening to a lecture on surgical approaches. … Surgeons said they sensed the 'presence' of the student in the surgical theater in an even more meaningful and intimate manner than being physically present in a corner of the OR."[10]

A variety of livestreaming tools were used to conduct those experiments, but each of them depended entirely on the availability of technology capable of broadcasting uninterrupted, high-resolution images. Those same attributes define the Avail System, and they are what make the product especially valuable to University of Utah Health, Dr. Taussky said.

"The system is so nimble that we can now broadcast emergent procedures, such as stroke thrombectomies, without advance notice," he said, "allowing larger segments of the medical community to observe and learn from these rarely shared surgeries."

William Nicholson, MD, of Emory Healthcare, sees long-range uses for the technology.

"The Avail System facilitates swifter and more effective training and education for our team and the students we teach, whether the topic of the day is learning how to conduct a procedure or how to use new devices and tools," said Dr. Nicholson, director of Interventional Cardiology and an associate professor. "We don't think of this strictly as a pandemic solution; we look at it as an essential collaborative tool for the long term."

Taking Livestreaming into the Future

Avail's pioneering, comprehensive hardware/software system includes a lightweight console on wheels that can easily be moved through a facility and paired to different rooms. The console includes two high-definition pan-tilt-zoom cameras with 30x zoom, a large display monitor, and plug-ins for procedural imaging sources.

The second component of the system is a secure, web-based app, enabling remote users to control cameras and get up-close views of the surgical field, the physician's hands, the team members conducting the procedure, and even the back table holding surgical equipment. A split-screen feature enables those watching to control camera views of the procedure while also examining any imaging being conducted while the treatment is underway, such as intravenous ultrasound or fluoroscopy. Viewers have the opportunity to collaborate with the broadcasting practitioner via two-way audio and by making annotations on their own screens that will be visible on a procedure-room display.

Users connect by answering a call on their iPad or laptop that is sent from the console, which is stationed in the procedure room near the treating practitioner. In addition, users can share broadcasts with larger audiences, such as classes of medical students.

The third component of the Avail System is the Avail Member Hub, accessible via login on Avail.io, which allows users to manage schedules, update availability in real time, and collaborate at the click of a button. The Portal also provides tools to help medical device representatives, particularly those in the field, to better manage time and relationships.

The Avail System is particularly cost-effective because there is no capital expenditure involved, but rather a subscription-based fee.

"Now that we've learned the value this system brings, we understand how it can exponentially expand our remote educational opportunities," said Jorge Chahla, MD, PhD, assistant professor of Orthopedic Surgery at Rush University Medical Center and a team physician for the Chicago White Sox (MLB), the Chicago Bulls (NBA), and the Chicago Fire (MLS). "It could be used to allow the best and brightest experts to proctor medical students from afar, to make medical education in low-resource settings more robust, or even to allow students all over the world to watch a surgeon teach a procedure he invented. Ultimately, that will do wonders to improve the care we provide to our patients."

Conclusion

Looking back on the COVID-19 pandemic, it's clear that the restrictions on in-person collaboration associated with this unique period in world history had a chilling effect on medical education.

Yet, even before the pandemic, opportunities for live procedural education were limited, and experts anticipate that this shortage will extend well into the future.

Fortunately, numerous studies demonstrate that the real-time broadcast of live procedures is a cost-effective and easy-to-use solution to the educational gap for medical students, residents, fellows, licensed physicians, and members of the medical device industry. Moreover, after a pandemic year spent delving more deeply into technology and virtual learning, these stakeholders stand ready to fully embrace livestreaming from the procedure room.

As a result, learners are poised to reap the benefits as medical associations make virtual components a permanent part of their annual conferences, including the livestreaming of teaching cases to the largest audiences possible. Similarly, medical and device professionals in myriad settings across the globe will continue to capitalize on the convenience and cost-effectiveness of providing and receiving education without the need for travel.

Overall, this trend will bolster the medical field, allowing it to offer its members a richer educational environment than ever before. Through the use of the Avail System, these learning opportunities are expected to become increasingly accessible to students, doctors, and device experts, no matter where or when the need arises

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