Implementation Brief ■

The iCritical Care Podcast: A Novel Medium for Critical Care Communication and Education

RICHARD H. SAVEL, MD, EVAN B. GOLDSTEIN, DO, ELI N. PERENCEVICH, MD, MS, PETER B. ANGOOD, MD

Abstract Podcasting is a recent creation combining old and new technologies allowing rapid, inexpensive delivery of media content (primarily audio) to the end user, both via the desktop environment and personal media players. The authors' group (the Society of Critical Care Medicine) saw the educational and communication potential for the podcasting concept, and have successfully designed and implemented the first podcast of a national medical society. As of this writing, there are an average of (mean ± SD) 664 ± 290 total downloads per podcast, and their podcast feed has been hit over 68,000 times in its first seven months. In this manuscript, the authors provide documentation of their successful endeavor, as well as a structured framework for other organizations to create similar products.

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Introduction

Multiple recent changes in the field of information technology have changed the way clinicians can obtain access to the information required to care for the critically ill patient. Some of these enhancements include: the availability of high-speed internet access; the increasing popularity of portable media players; and the dramatic decrease in physical size of mass storage devices, with a simultaneous increase in their capacity. This confluence of technological enhancements has contributed to the development of a new form of media content delivery technology called podcasting.

The term podcast is a portmanteau of the words "iPod"—the popular portable media player by Apple Computer (Cupertino, CA, USA)—and "broadcast." In brief, when a user subscribes to a podcast, audio content is downloaded over the internet to a user's computer; when his or her portable media player is attached to that computer, the new audio content is automatically placed on the portable device.[1] As new editions of the podcast become available, the content (usually in the form of an audio MP3 file) is automatically downloaded to the user's computer and, subsequently, his or her portable device: the subscriber being required to do no more than obtain the initial subscription. It is this simplicity that leads to the true power of the concept behind podcasting, which can be thought of as a series of time-shifted radio shows to be heard whenever and wherever it is most convenient for the user. Importantly, an iPod device is not required to listen to podcasts; they can be heard on any portable digital media player, and on personal computers.

Given the worldwide educational potential that podcasting represents for critical care clinicians, the Society of Critical Care Medicine (SCCM) decided to design and implement the first podcast for an international medical society: named the iCritical Care Podcast. This manuscript describes basic aspects of subscribing and listening to a podcast, as well as providing a "how-to" guide for those wishing to create their own medical podcast; and explaining how this technology is currently being used to enhance the educational experience of the members of SCCM.

System Design and Implementation

Subscribing and Listening to a Podcast

There are multiple ways in which someone can experience the iCritical Care Podcast. The simplest manner is through the combination of an iPod and iTunes (the free, downloadable software that accompanies every iPod). The first step is to visit the SCCM podcast Web page (http://www.sccm.org/podcast) and select the "iTunes" icon (Figure 1). In so doing, the iTunes software opens and is directed to the SCCM podcast (Figure 2). The subscriber simply needs to click on the "subscribe" button—no further steps are necessary. The software allows the most recent episodes of the podcast to be downloaded to the person's computer. The subscriber can then listen to the various podcasts directly on the computer through the iTunes software. However, the full potential does not become realized until the user plugs

Affiliations of the authors: Department of Surgery, Maimonides Medical Center (RHS, EBG), Brooklyn, NY; VA Maryland Health Care System and Department of Epidemiology and Preventive Medicine, University of Maryland School of Medicine (ENP), Baltimore, MD; Joint Commission International Center for Patient Safety (PBA), Oak Brook, IL.

Dr. Savel is an Assistant Professor of Medicine at the Mount Sinai School of Medicine in New York City.

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Correspondence and reprints: Richard H. Savel, MD, Department of Surgery, Division of Surgical Critical Care, Maimonides Medical Center, 4802 10th Avenue, Brooklyn, NY 11219; Tel: (718) 283-7991; Fax: (646) 219-2129. e-mail: <rhsavel@yahoo.com>.

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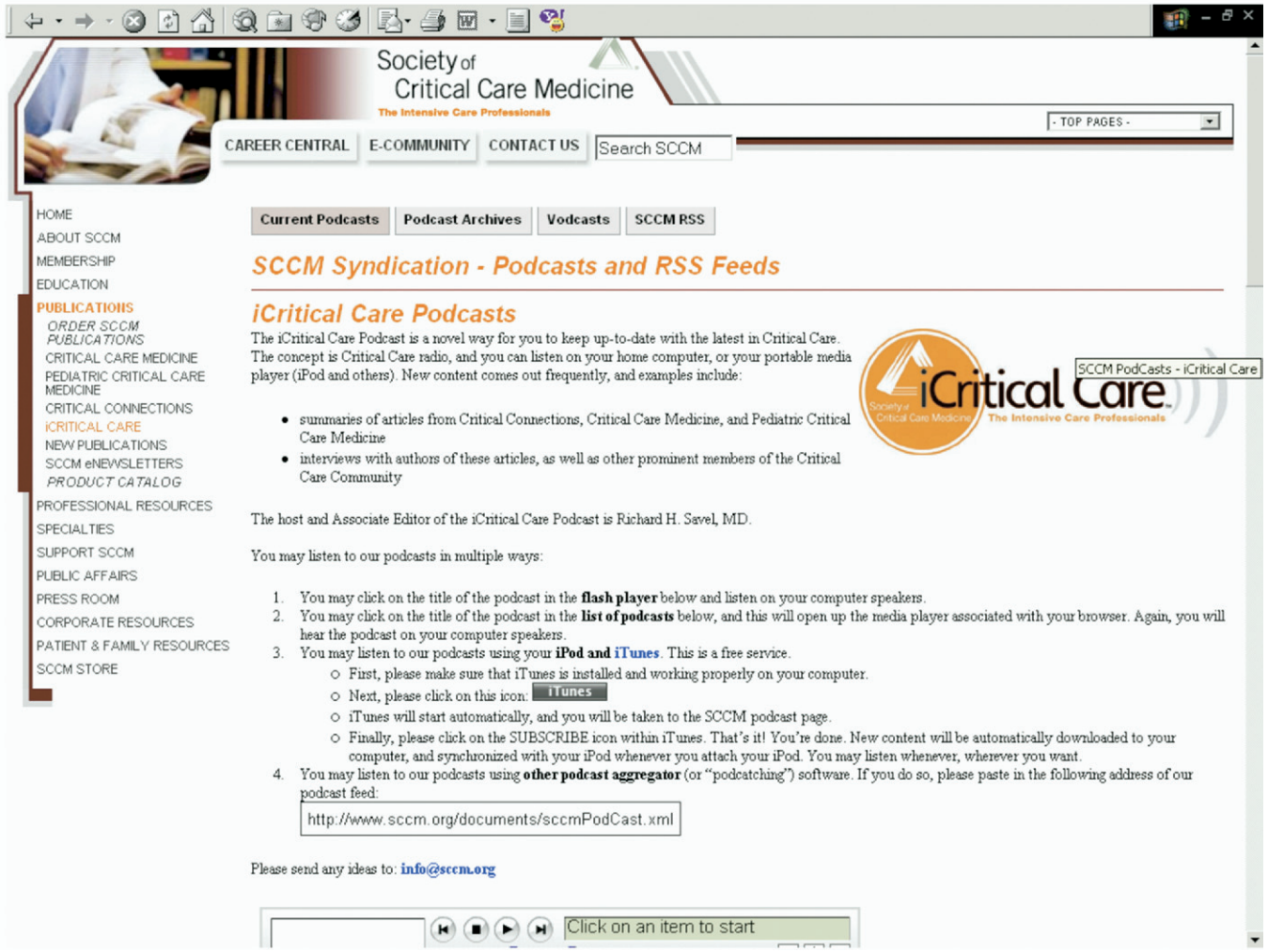

Figure 1. SCCM iCritical Care Podcast Web page at http://www.sccm.org/podcast.

the iPod (usually via a universal serial bus [USB] 2.0 port) into the computer. When this is done, updates for the downloaded podcasts will then be placed onto the iPod every time the device is connected to the computer and synchronized.

Alternatively, one can subscribe to the podcast using a portable media player other than an iPod. In order to do this, it is necessary to download another piece of (free) software called a "podcast aggregator" or "podcatcher." For a list of podcast aggregators, please see http://www.podcastingnews.com/topics/Podcast_Software.html. Once this software is installed, the podcast subscription process remains very similar.

Creating a Podcast I: Construction of MP3 Files

The construction of a high-quality audio file is the single most important aspect of creating a podcast to which users will remain subscribed. The first step in the audio chain is a professional microphone: the one utilized for the iCritical Care Podcast is a dynamic microphone (SM58, Shure Inc., Niles, IL, cost $99 US). This microphone is then connected to a USB audio interface (UA-25, Roland Corporation, Los Angeles, CA, cost $239 US). The USB audio interface is a critical component, as this is where the analog signal from the microphone is converted to a digital signal, which can be stored and edited on a computer. Finally, the USB audio interface can easily be connected to a personal computer through its USB port.

Another important piece of equipment is a digital audio hybrid (DAH) (Innkeeper PBX, JK Audio, Sandwich, IL, cost $459 US). Since a major component of the iCritical Care Podcast is interviews, this equipment is necessary as it facilitates recording a telephone interview in a high-quality fashion. Unfortunately, audio signal captured from a telephone is inherently low quality, and the DAH optimizes the signal obtained from a phone line similar to that of a professional radio call-in show.

The final step in the creation of a high-quality audio file is the audio recording software. A freeware program entitled Audacity was used as the primary tool for audio creation and editing (http://audacity.sourceforge.net, Figure 3). Once produced, the audio file is saved in MP3 format (sample rate 44100 Hz, sample format 16-bit, bit rate 96 kbps), and is then ready for posting as a podcast.

Creating a Podcast II: Distribution of MP3 Files

Once the ability to create professional-quality audio files has been arranged, the final step is to develop the podcast feed. The technology behind podcasting is called "RSS feeds with enclosures," with RSS standing for "really simple syndica-

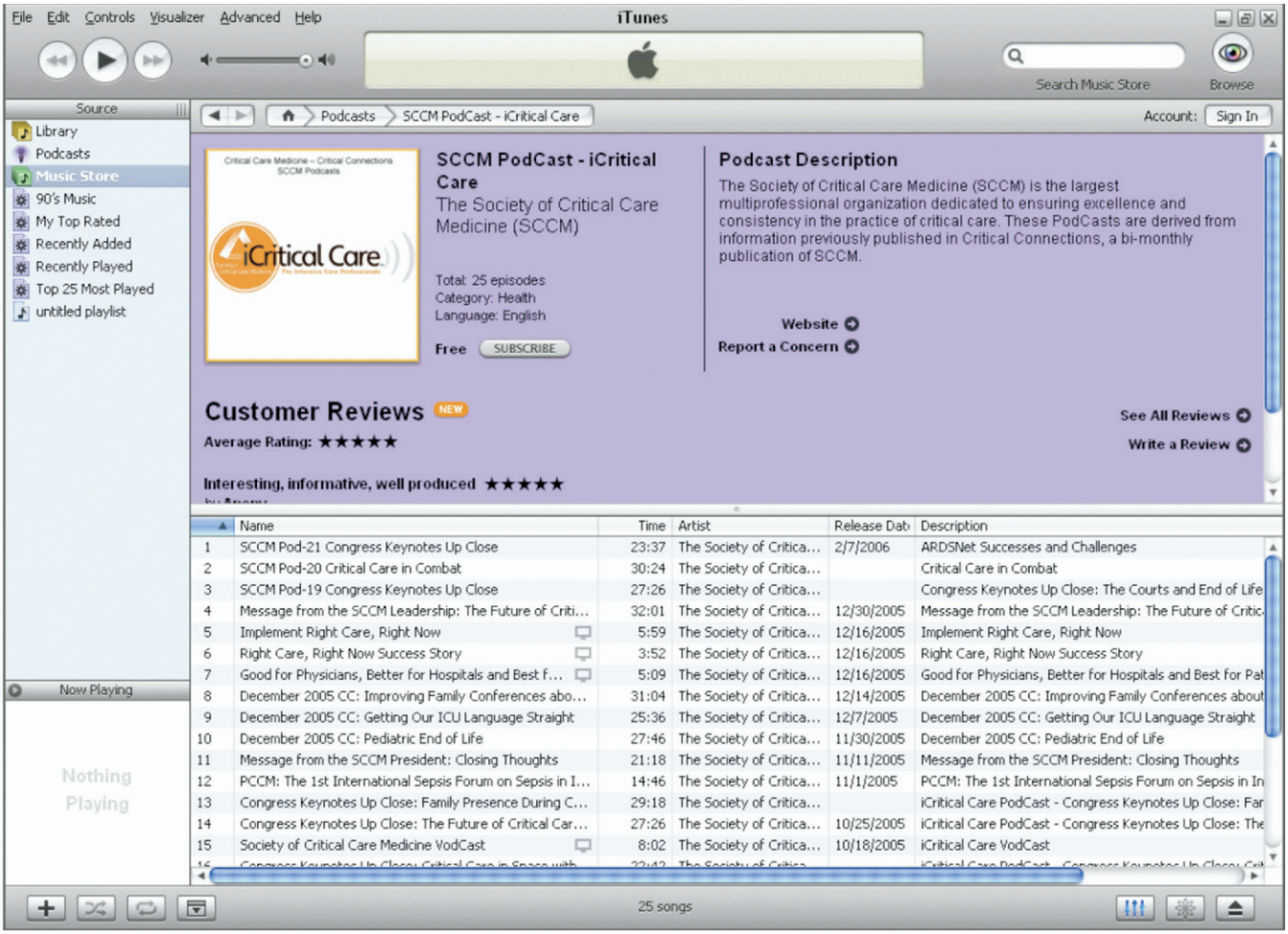

Figure 2. SCCM iCritical Care Podcast on iTunes™ software.

tion."[2] An RSS feed consists of a text file written in XML (extensible markup language); RSS is often described as a dialect of XML.[3] XML is a markup language (similar to HTML [hypertext markup language] used to create Web pages) that—in the case of an RSS feed/podcast—provides the podcatching software the information necessary to allow a user to subscribe to a particular podcast, i.e., where the content files are located, their names, as well as their descriptions.

Every time the podcatching software checks the RSS feed to see if new audio content is available, it does so by analyzing the RSS feed and determining if there are any audio files listed in the feed that are not on the subscriber's computer. If new content exists, it will be downloaded to the user's computer. Alternatively, there are a plethora of commercial podcast hosting companies available that can simplify the process by delivering the hosting services (appropriate server, storage, and bandwidth facilities), as well as dynamically generating an RSS feed. A list of such companies can be found at http://www.podcastingnews.com/topics/Podcast_Hosts.html.

Creating a Podcast III: Focus on High-quality Content

After the technical steps of creating podcast files have been accomplished, the focus then shifts to content creation. The vision for the iCritical Care Podcast was that critical care clinicians (our target audience consisting primarily of intensivists, critical care nurses, respiratory therapists, and pharmacists) would be interested in three major areas: audio companions to articles published in SCCM journals (Critical Care Medicine, Pediatric Critical Care Medicine, and the bimonthly newsletter Critical Connections), interviews with prominent members of the critical care community, and a forum for the leaders of SCCM to keep in touch with the members of SCCM throughout the year. Conceptually, busy clinicians could then integrate the podcasts into their schedule (such as during commuting or when exercising) as a method of keeping up with the rapidly changing critical care literature. Alternatively, the podcast could provide increased depth for articles a clinician may have read, and offer a richer understanding of the material. The target duration for the podcasts was approximately 20 minutes, with a delivery schedule of between once a week to once every two weeks.

The iCritical Care Podcast is very much a work-in-progress; nevertheless, there is evaluative data that people are listening. There are an average of 664±290 (mean ± SD) total downloads per podcast (Table 1), and the RSS feed has been accessed 68,194 times from the release of the first podcast on August 2nd, 2005 to March 17, 2006. Additionally, the podcast was chosen from among thousands and featured in

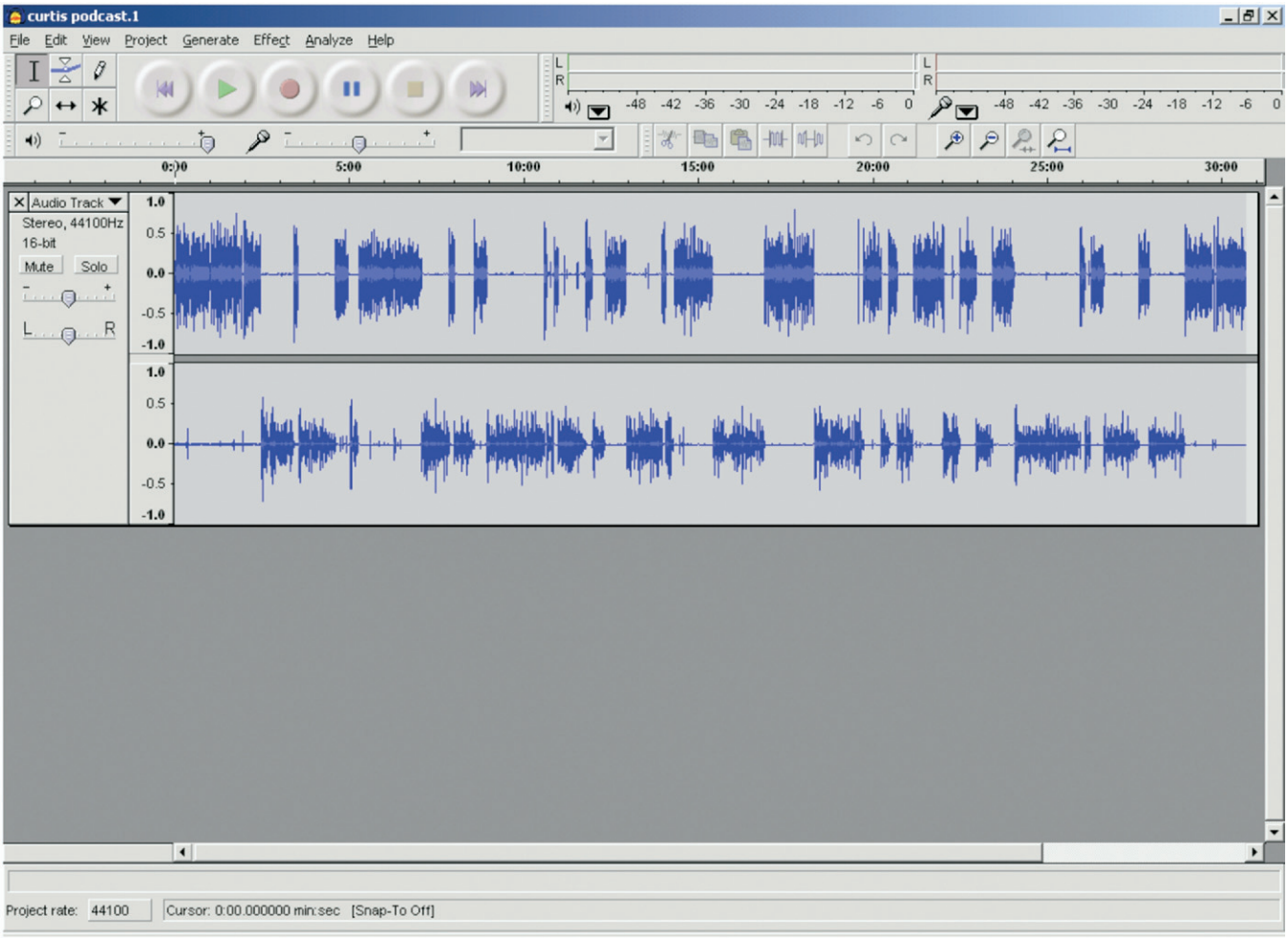

Figure 3. Audio editing software, Audacity®.

the "new and notable" section of Apple Computer's iTunes music store because of its "deep, professional content" (personal communication, Pete Alcorn, Apple Computer, Inc., November 2, 2005).

An important logistical step was the development of a structured process for the selection of topics for the podcasts. This involved the initial approval of the podcast concept by the SCCM leadership, as well as developing ongoing, close coordination with the SCCM director of publications and managing editor of member communications. Initially there were legal concerns that statements made during the podcasts not be taken to be official statements of SCCM, and, as such, an audio disclaimer was placed at the beginning of each podcast.

Though a complete list of podcasts can be seen on the SCCM Web site, examples of interviews include: a recent article in Critical Care Medicine correlating early changes in organ function and outcomes in severe sepsis;[4] an update on what is new regarding the landmark ARDSnet trial;[5] the challenges of providing critical care in the combat setting; a series of interviews focusing on the complex issue of end-of-life in the ICU as well as family conferences and giving bad news,[6–9] and interviews with the current and former[10] president of SCCM. Examples of our plenary lecture podcasts include: a discussion of holistic nursing as well as family presence during CPR and invasive procedures;[11] a consultant's perspective on the future of critical care;[12] and the unique career of a chairman of a department of surgery who, in addition to being a molecular biologist, is a researcher with NASA focusing on critical care in outer space.[13] Finally, the iCritical Care Podcast was used as a novel medium for the members of SCCM who were affected by or volunteered in the aftermath of hurricane Katrina to share their experiences with others regarding this unprecedented natural disaster.

Discussion and Conclusion

In summary, the successful design and implementation of the first podcast of an international medical society has been documented. Although the initial product has been well received, there is clearly much work to be done. Two primary areas to develop at this point are: 1) grappling with the fact that the newest generation portable media players have the built-in capability to present video as well as audio, and that this video content can easily be integrated into the RSS/podcast feeds; and 2) working closely with the members of SCCM to get structured feedback as to what the membership, and other listeners, would best want from this new medium. For example, SCCM is in the process of performing a longitudinal survey of which SCCM members

Table 1 ■ Number of Downloads/Podcast as of March 8, 2006

SCCM Podcast	Date Posted	Downloads
SCCM Pod-24 Implementing the Surviving Sepsis Campaign	Mon, 06 March 2006	252
SCCM Pod-23 Preventing Pediatric Trauma	Fri, 24 Feb 2006	542
SCCM Pod-22 Early Indicators of Sepsis Survival	Tue, 14 Feb 2006	874
SCCM Pod-21 Congress Keynotes Up Close: ARDSNet	Tue, 7 Feb 2006	597
SCCM Pod-20 Critical Care in Combat	Thr, 2 Feb 2006	685
SCCM Pod-19 Congress Keynotes Up Close	Thr, 19 Jan 2006	859
Message from the SCCM Leadership: The Future of Critical Care, Dr. Durbin	Fri, 30 Dec 2005	1140
December 2005 CC: Improving Family Conferences. . .	Wed, 14 Dec 2005	797
December 2005 CC: Getting Our ICU Language Straight	Wed, 07 Dec 2005	850
December 2005 CC: Pediatric End of Life	Wed, 30 Nov 2005	932
Message from the SCCM President: Closing Thoughts. Dr. Angood	Fri, 11 Nov 2005	783
PCCM: The 1st International Sepsis Forum on Sepsis in Infants and Children	Tue, 1 Nov 2005	1358
Congress Keynotes Up Close: Family Presence During CPR and Invasive Procedures	Thr, 27 Oct 2005	883
Congress Keynotes Up Close: The Future of Critical Care with Brian Silverstein	Tue, 25 Oct 2005	757
Congress Keynotes Up Close: Critical Care in Space with Dr. Dulchavsky	Thr, 6 Oct 2005	770
Katrina Response: Caring for Evacuees	Thr, 6 Oct 2005	472
Katrina Response: Providing Relief on the Front Lines	Mon, 19 Sep 2005	730
Interview with Peter B. Angood, MD, FCCM	Thr, 15 Sep 2005	280
SCCM Annual Congress—New Dates and New Location Announced	Fri, 9 Sep 2005	227
Critical Care Pharmacists	Fri, 9 Sep 2005	480
PICU Care of Children with Cancer	Wed, 10 Aug 2005	328
Advocacy Caucus in Washington, D.C.	Tue, 09 Aug 2005	257
Pharmaceutical Dilemmas in the ICU Cancer Patient	Mon, 08 Aug 2005	432
Critical Care of Cancer Patients	Mon, 02 Aug 2005	646
Average number of downloads per podcast		664±290

are listening to the podcast, how they are listening (computer, iPod, or other media player), and what future topics they would want addressed. The plan is to utilize Web-based, e-mail-based, and paper-based surveys to provide members with the opportunity to shape the future of the iCritical Care podcast. Along those lines, SCCM plans to explore the potential for podcasts to become a source of continuing education credit for all members of the multidisciplinary critical care team. One final area to be discussed is monetization of the podcast. As a society, SCCM has the philosophy that educational products it creates or endorses be free from commercial support in order to provide members with unbiased didactic material. Hence, SCCM has not solicited outside commercial funding for this endeavor to date. By comparison, non-medical podcasts have been able to receive remuneration for their work through two primary venues: either audio advertising placed within the podcast, or some form of paid subscription.

Barriers still exist to the widespread use of internet-based technologies in the delivery of educational materials for clinicians, including a lack of understanding of computers and the internet.[14] Nevertheless, recent data reveals that internet-based continuing medical education (CME) programs can be as valuable as other forms of CME in imparting knowledge;[15] other recent studies have shown that internet-based CME can be as effective (or more so in certain cases) as live CME with regards to changing physician behavior.[16]

Podcasting in general—and medical podcasting in specific—is in its infancy. Given the decidedly positive reaction to the iCritical Care Podcast, however, this rapidly developing technology clearly has significant untapped potential as a medical education tool not only for members of the critical care community, but for all health care professionals. Currently, this educational potential is no longer limited by technology, but by resources, needs, time, and imagination.

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