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Podcasts in hepatopancreatobiliary surgery: leveraging artificial intelligence for an emerging educational platform

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Abstract

Aim: The study examines the evolving role of podcasts as educational tools for hepatopancreaticobiliary (HPB) surgeons, emphasizing their flexibility, accessibility, and potential for fostering global learning communities.

Methods: We review the rise of podcasts, focusing on general and HPB surgery podcasts, including their content, reach, and engagement metrics. It compares data from various podcast platforms and explores the integration of artificial intelligence (AI)-powered translation and dubbing technologies to address language barriers in medical education.

Results: Podcasts are becoming an increasingly valuable resource for surgeons, particularly those in HPB surgery. Specialized podcasts such as “Behind the Knife” offer high engagement with focused content, while general surgery podcasts provide broader yet less concentrated education. AI technologies can enhance global accessibility by overcoming language barriers, enabling non-English-speaking surgeons to benefit from these educational resources. AI-driven voice synthesis tools like Rask.AI, ElevenLabs, and Lovo.ai enhance the listening experience by creating natural-sounding, real-time dubbed voiceovers in multiple languages, with Lovo.ai specifically leveraging



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machine learning to ensure accurate and contextually appropriate translations for specialized fields like surgery.

Conclusion: Podcasts are poised to become central to HPB surgical education, offering flexibility and global reach. Addressing content fragmentation and language barriers through AI and centralizing resources could enhance their effectiveness, making high-quality medical education more inclusive and accessible worldwide.

Keywords: Podcasts, HPB surgery, artificial intelligence, medical education, endoscopic surgery

INTRODUCTION

Over the past few decades, medical education has witnessed a paradigm shift, transitioning from traditional, static learning resources to more dynamic, digital platforms^[1-3]. In earlier times, surgeons predominantly relied on textbooks and medical journals for knowledge acquisition^[1-3]. However, these sources often lacked the immediacy needed to keep pace with the rapid advancements in surgical techniques and technologies. With the advent of the internet, digital media such as webinars, videos, and social networks have transformed the way healthcare professionals access and absorb information. Among these emerging tools, podcasts have gained significant popularity due to their flexibility and accessibility, offering professionals the ability to learn on the go.

In the field of surgery, particularly in the specialized area of hepatopancreaticobiliary (HPB) surgery, keeping up to date with complex, evolving practices is crucial. HPB surgeons face unique challenges, requiring continuous exposure to the latest advancements in minimally invasive techniques, endoscopic procedures, and cutting-edge technologies like artificial intelligence (AI). Podcasts, with their capacity to deliver curated, expert-driven content, have emerged as an invaluable resource for HPB surgeons seeking to stay current despite demanding schedules^[3-7]. Yet, despite the increasing availability of podcasts, the fragmentation of content and the lack of centralized resources make it challenging for surgeons to identify high-quality, relevant educational materials.

Moreover, the global reach of these educational tools is limited by language barriers, which hinder access for non-English-speaking professionals. Leveraging AI-driven translation and voice dubbing technologies presents an opportunity to break these barriers, democratizing access to continuous medical education across different regions and languages.

The aim of this paper is to explore the role of podcasts as educational tools in HPB surgery, assess their reach and impact, and examine how integrating AI technologies can enhance their global accessibility. Additionally, we propose strategies to centralize specialized podcast content to create a more streamlined, inclusive learning experience for surgeons worldwide.

METHODS

This study utilized a mixed methods approach to assess the role of podcasts in HPB surgery education. Podcasts were selected based on inclusion criteria such as relevance, and public availability. Data on engagement metrics - including the number of episodes, downloads, and audience interactions - were collected from major platforms, including YouTube, Spotify, Apple Podcasts, Google Podcasts, and Web podcasts. Podcasts were included in any language, irrespective of episode count. The data collected span from January 2011 to August 2024. This methodological approach sought to provide a detailed understanding of podcast reach and focus in HPB surgical education.

RESULTS

HPB surgery podcasts

General surgery podcasts offer a broad overview, but those dedicated to HPB surgery go much deeper, tackling the unique challenges and advanced techniques specific to liver, pancreas, and biliary tract surgeries. For surgeons focused on this specialized field, these podcasts are gold mines of targeted insights, complex case studies, and shared experiences that are hard to find elsewhere^[8,9]. Their precision and relevance make them indispensable tools for anyone serious about mastering HPB surgery, especially with the added dimension of emerging technologies like AI.

A clear picture of how these resources stack up is demonstrated in [Figure 1](#), comparing the total number of episodes from general surgery podcasts with those dedicated to HPB surgery^[10-16]. Behind the Knife leads with 773 total episodes, of which 83 focus on HPB surgery, representing 10.7% of its content. Other general surgery podcasts like Cold Steel (149 episodes) and JAMA Surgery (109 episodes) also contribute to HPB education but in smaller proportions (20 and 9 episodes, respectively)^[10-12]. The AI and Cybersurgery podcast uniquely combines AI with surgical practices with 50 total episodes, dedicating 16 episodes to HPB surgery^[13]. This offers a forward-looking perspective that is increasingly relevant as technology integrates more deeply into medical fields.

HPB surgical endoscopy podcasts

As minimally invasive techniques gain prominence, podcasts dedicated to endoscopic hepatobiliary surgery have become valuable resources. These specialized podcasts highlight the latest advancements in laparoscopic and endoscopic methods, detailing innovations that reduce recovery times and surgical risks. Within the broader spectrum of gastro-intestinal (GI) endoscopy, the focus on hepatobiliary surgery varies significantly across different podcasts.

[Figure 2](#) illustrates the proportion of hepatobiliary-focused episodes compared to other non-HPB episodes across three major GI endoscopy podcasts. Boston Scientific's GI Endocast leads, with 20 out of 27 episodes (approximately 74%) focusing on HPB surgery^[17]. This demonstrates a strong dedication to this subspecialty. In contrast, the GIE Journal podcast has a much broader content range. Only 4 out of 117 episodes (around 3%) are dedicated to HPB topics, reflecting its global approach to GI endoscopy. Meanwhile, the GI Endoscopy ASGE podcast strikes a balance, with 6 out of 26 episodes (about 23%) focusing on HPB surgery^[18,19]. For those specializing in HPB surgery, podcasts like GI Endocast offer a more concentrated learning experience, while others like GIE Journal may provide broader, though less specialized, content. Selecting a podcast that fits with specific educational standards is important.

HPB episode reach and engagement metrics

Understanding the reach and impact of each podcast goes beyond the number of episodes and delves into how frequently these episodes are consumed by the audience. [Figure 3](#) illustrates the average downloads/views per episode of the key podcasts in surgery.

The average number of downloads/views for each episode is the focus of [Figure 3](#), which looks at the engagement metrics of multiple surgical podcasts. With an amazing average of 12,940 downloads/views per episode, Behind the Knife stands out and demonstrates its popularity and effect^[10]. This high degree of interaction shows that the audience finds great meaning in the content, which positions it as a top surgical education resource.

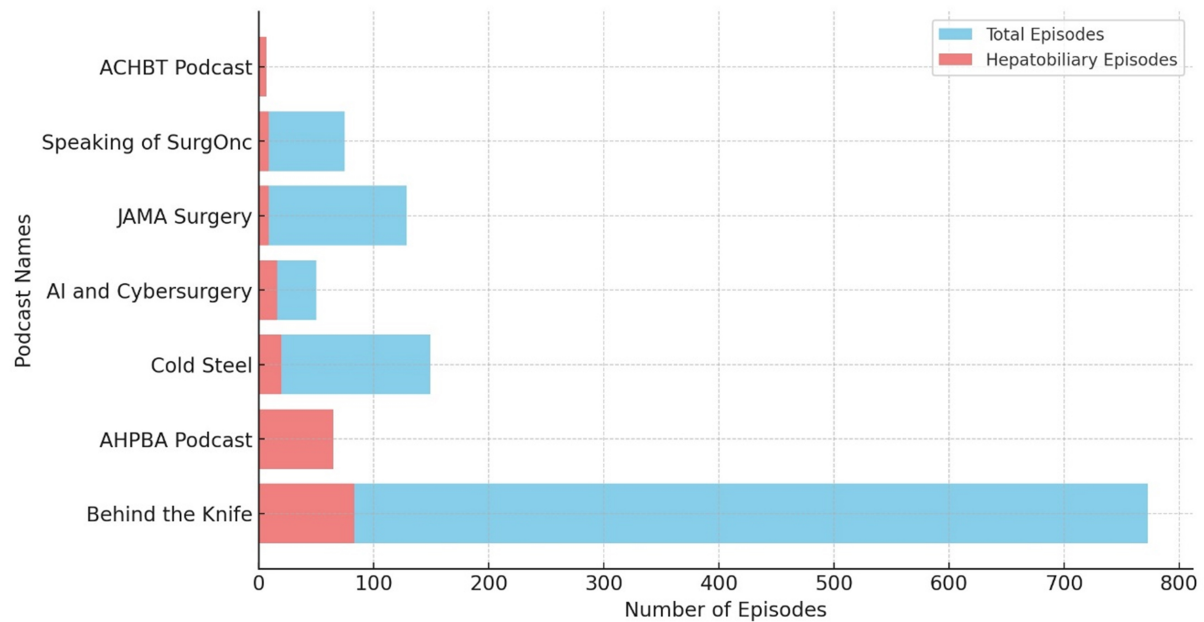


Figure 1. Current surgery podcast: proportion of hepatobiliary episodes as of August 31, 2024.

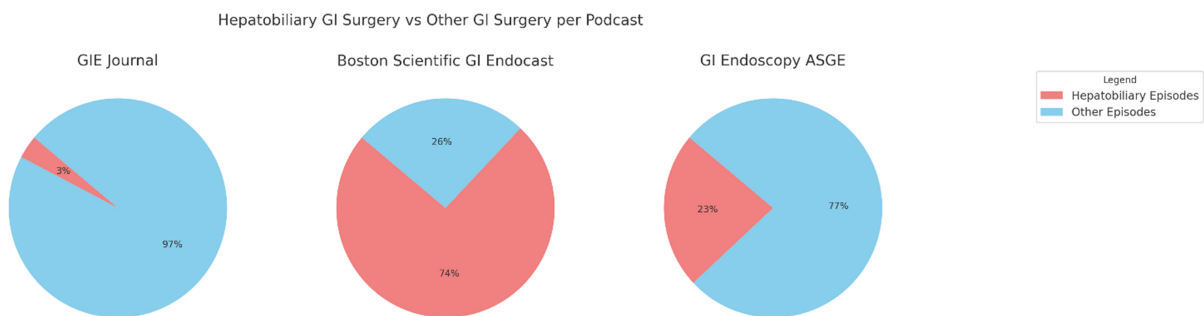


Figure 2. Current endoscopy podcasts: proportion of hepatobiliary episodes as of August 31, 2024.

On the other hand, specialized podcasts such as AI and Cybersurgery have an average of 177 per episode, demonstrating that they may build up a loyal audience while releasing fewer episodes^[13]. This indicates the great capacity to serve those who are only interested in the connection between AI and surgery.

The differences in reach and influence of both general interest and specialized content podcasts are illustrated by these metrics. Using these results, surgeons who want to keep current on HPB surgery can select podcasts that effectively engage their target audience while preserving pertinent information.

Figure 4 illustrates the annual growth in podcast episodes across various surgical education platforms from 2011 to 2024, with a specific focus on HPB content. “Behind the Knife” exhibits the most significant growth, particularly after 2017, peaking in 2022 before a slight decline and another surge in 2024. “Cold Steel” experienced rapid expansion between 2019 and 2021 before declining. The emergence of “AI and Cybersurgery” in 2023 highlights the increasing role of AI-driven innovations in HPB surgical education. “JAMA Surgery” maintains a consistent output, while “Speaking of SurgOnc” and “AHPBA” contribute a steady but smaller number of episodes. “ACHBT Podcast” remains the least active. The overall trend

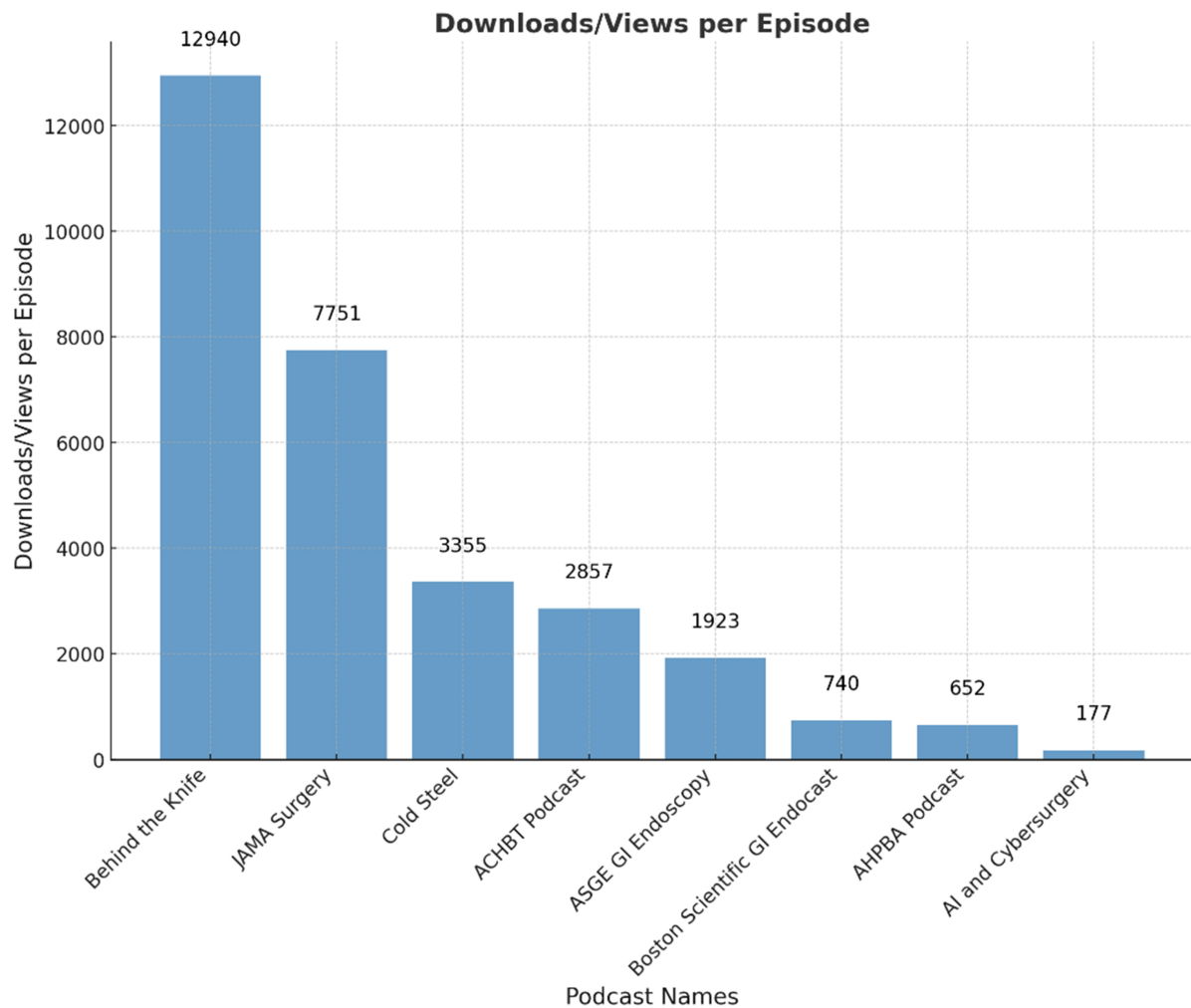


Figure 3. Average downloads/views per podcast episode.

suggests a rising adoption of podcasts in HPB surgical education, with AI-driven content enhancing accessibility and engagement.

DISCUSSION

While specific studies focusing exclusively on the application of AI in HPB surgery education are limited, AI has been increasingly utilized in surgical education more broadly, including areas relevant to HPB surgery. For instance, AI-driven 3D visualization, virtual simulation, and augmented reality have been employed to enhance the training of surgeons, providing immersive and interactive learning experiences^[1]. These technologies facilitate a deeper understanding of complex anatomical structures and surgical procedures, which are crucial in HPB surgery. Additionally, machine learning models have been developed to predict surgical outcomes, which can be integrated into educational curricula to teach surgical decision making and risk assessment^[20]. By analyzing large datasets, these models assist in identifying patterns and outcomes that are valuable for educational purposes. Furthermore, AI applications in image analysis and computer vision have been explored to improve diagnostic accuracy and procedural planning in HPB surgery^[21]. These advancements can be incorporated into educational programs to train surgeons in interpreting complex imaging and planning surgical interventions.

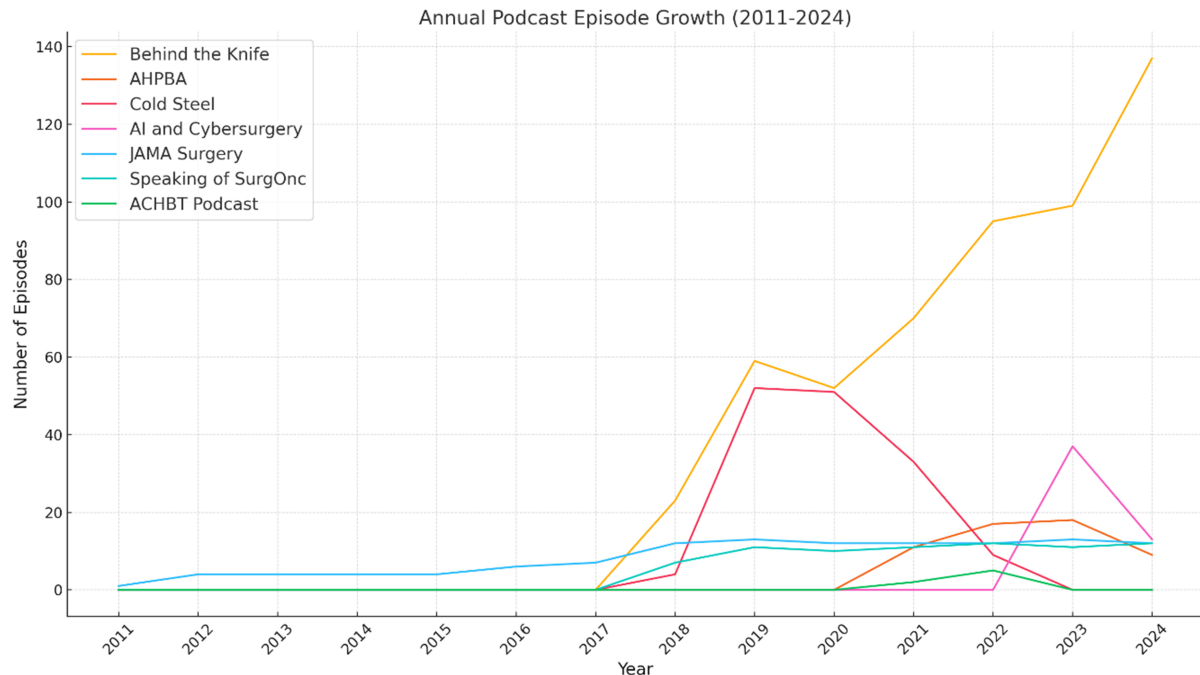


Figure 4. Annual number of HPB episodes produced by leading surgical podcasts. HPB: Hepatopancreaticobiliary.

Although there is a wealth of valuable content available, the fragmentation of these resources poses a significant challenge, particularly for HPB surgeons who struggle to efficiently find high-quality, relevant podcasts. A centralized platform that consolidates specialized podcasts, including those focused on endoscopic techniques, could revolutionize access to rich, relevant content. Such a platform would not only streamline the learning process, ensuring consistent exposure to the best practices in HPB surgery, but also foster a global learning community. By bringing together experts, pioneers, and professionals from diverse backgrounds, this centralized resource would create a space for shared knowledge and collaboration. HPB surgeons would no longer just learn but contribute to a global community dedicated to excellence in HPB surgery, driving continuous improvement and innovation across geographic boundaries.

HPB podcasts provide surgeons with continuous access to the latest advancements. Their true potential, however, lies in extending beyond the borders of so-called developed nations^[22]. One of the most significant challenges in global medical education is the language barrier. Surgeons around the world speak different languages, and while English often serves as the common language in medical literature, not every practitioner can fully engage with complex content in a non-native tongue. This limitation restricts access to vital educational resources, particularly in regions with limited English proficiency.

To bridge this gap, integrating AI-powered translation services and voice dubbing into podcasts is essential. Imagine listening to a podcast in your native language, with the content delivered seamlessly. Translation services generate transcripts of episodes in multiple languages, enabling non-English-speaking surgeons to follow along effortlessly^[23]. Many AI-driven voice synthesis tools like Rask.AI and ElevenLabs offer a more immersive experience by creating natural-sounding voiceovers for real-time dubbing in various languages. For example, a Spanish-speaking surgeon could listen to an English-recorded podcast fully dubbed in Spanish, receiving the same quality of information without the distraction of real-time translation.

AI takes this a step further with machine learning algorithms, trained to understand the specific terminology and nuances of medical language^[24]. AI-powered tools like Lovo.ai can instantly convert podcasts into multiple languages with remarkable accuracy, and ensure translations are precise and contextually appropriate.

By integrating these advanced technologies, podcasts can overcome language barriers and become truly global educational tools. Surgeons in remote or underserved areas, who might otherwise miss out on vital knowledge, can stay connected and informed. This evolution in podcasting is not just an advancement; it is a leap toward greater health equity. By making high-quality medical education universally accessible, we ensure that every patient, no matter where they live, receives the highest standard of care. For HPB surgeons, this means contributing to a global movement that is reshaping healthcare by delivering the latest surgical knowledge to those who need it most. As we continue to innovate in medical education, addressing language barriers is crucial.

High-quality educational resources can be accessible to every surgeon regardless of their native language or location. This approach democratizes learning and strengthens the global surgical community, fostering collaboration and shared expertise across borders^[25,26].

Reviewing this topic does reveal several limitations when comparing podcast engagement in HPB surgery to other surgical education methods like webinars, journal clubs, or video-based learning. Webinars offer real-time interaction and the ability to ask questions directly, fostering a dynamic learning environment. Journal clubs provide in-depth analysis and critical thinking through group discussions, while video-based learning allows for visual demonstrations of surgical techniques, which can be more impactful for certain learners. Podcasts, while convenient and accessible, may lack these interactive and visual components, potentially limiting their effectiveness in conveying complex surgical procedures.

Current AI-powered podcast tools also have notable limitations. Despite their advanced capabilities, the accuracy of medical terminology translation remains a concern. Subtle nuances and specialized jargon in HPB surgery may not always be accurately captured, leading to potential misunderstandings. Additionally, there is a risk of bias in content recommendations, which could skew the learning experience and limit exposure to a diverse range of perspectives. Privacy concerns are another critical issue, as data collection for personalized recommendations could compromise user confidentiality. Moreover, specific accessibility challenges persist, particularly in developing countries where limited internet access can hinder the widespread adoption of these AI-driven educational tools. Addressing these limitations is essential to fully realize the potential of podcasts as a comprehensive educational resource in HPB surgery.

DECLARATIONS

Authors' contributions

Made substantial contributions to the conception and design of the study and performed data analysis and interpretation: Benhadda M, Gomes S, Makarian R, Tierens T, Vanlander A, Messaoudi N

Performed data acquisition, as well as providing administrative, technical, and material support: Benhadda M, Messaoudi N

Availability of data and materials

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Financial support and sponsorship

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Conflicts of interest

All authors declared that there are no conflicts of interest.

Ethical approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

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