How podcasts teach: A comprehensive analysis of the didactic methods of the top hundred medical podcasts

Ellen Zhang, Nicolas Trad, Robert Corty, Dave Zohrob, Shreya Trivedi & Adam Rodman

Published online: 08 May 2022.

Submit your article to this journal

Article views: 408

View related articles

View Crossmark data

MEDICAL TEACHER

Taylor & Francis
Taylor & Francis Group

Check for updates

How podcasts teach: A comprehensive analysis of the didactic methods of the top hundred medical podcasts

Ellen Zhang[a], Nicolas Trad[a] (iD), Robert Corty[b], Dave Zohrob[c], Shreya Trivedi[a,d,e] (iD) and Adam Rodman[a,d,e] (iD)

[a]Harvard Medical School, Boston, MA, USA; [b]Department of Internal Medicine, Vanderbilt University Medical Center, Nashville, TN, USA; [c]Chartable, New York, NY, USA; [d]Division of General Internal Medicine, Department of Medicine, Beth Israel Deaconess Medical Center, Boston, MA, USA; [e]Innovations in Media and Education Delivery (iMED) Initiative, Beth Israel Deaconess Medical Center, Boston, MA, USA

ABSTRACT

Purpose: Medical podcasts have grown in popularity, but little is known about their didactic methods. This study sought to systemically describe the pedagogical approach employed by the 100 most popular medical podcasts in the United States. This study also aimed to assess factors related to quality control and conflicts of interest in podcasting.

Methods: The authors averaged the rank positions for Apple podcasts in the Medicine category in the United States from 06/01/18 to 09/30/20 to generate a list of the 100 highest-ranked medical podcasts. They developed and validated a categorization system of didactic methods based on Bloom's taxonomy and collected data on didactic methods, as well as podcast affiliation, target audience, format, advertising, continuing medical education (CME) offerings, and presence of a reference list or review process.

Results: Of the 100 most popular medical podcasts, 91 are educational. Of those, 51 are podcasts intended for physician education (PIPEs) while 40 are intended for other audiences, including the general public, nurses, and physical therapists. Compared with podcasts intended for other audiences, PIPEs engage higher levels of Bloom's taxonomy ($p < 0.001$). Among PIPEs, 18 (35.2%) are affiliated with an individual, 16 (31.4%) with a company, and 12 (23.5%) with a professional journal. 38 PIPEs (74.5%) are targeted toward all levels of medical learners. PIPEs are significantly more likely to list references or have a peer review process in place ($n = 37$, 72.5% vs. $n = 15$, 37.5%, $p = 0.001$) and offer CME credits ($n = 20$, 39.2% vs. $n = 2$, 5.0%, $p < 0.001$) than podcasts intended for other audiences.

Conclusions: Medical podcasts employ a variety of didactic methods, including those ranked highly on Bloom's taxonomy. Unlike traditional medical education, PIPEs are commonly produced by individuals or companies and targeted to all levels of medical learners.

Introduction

Medical podcasts have grown dramatically in popularity and are now among the most common asynchronous learning resources used by medical residents (Kaplan et al. 2020). In 2014, podcasting was found to be the most frequently-used learning resource among emergency medicine residents (Mallin et al. 2014); in 2021, a survey of internal medicine residents found that podcasts were used as often as textbooks (Bernstein et al. 2021). Medical podcasting has spread to almost every single medical specialty, with all but neurosurgery having active educational podcasts in a recent review (Little et al. 2020). Podcasting is popular in a wide range of health professions beyond medicine, including nursing, pharmacy, and physical therapy (Abate 2013; Camp 2016; Blum 2018). Audiences include not only students and trainees, but also attending physicians and advanced practice providers who use podcasts to obtain continuing medical education (CME) credits (Berk, Trivedi, et al. 2020). Medical podcasts are consumed across the world, with the most popular having tens of

Practice points

- Medical podcasts seek to engage higher-level cognitive skills through the use of case-based learning and critical reviews of primary literature.
- Podcasts intended for physicians are more likely to have a review process and references for each episode than podcasts intended for other health professions.
- Medical podcasts flatten learning hierarchies by targeting information to all levels of training.
- Fewer than 10% of medical podcasts are produced by universities, training programs, or professional societies, suggesting an increasing democratization of digital education.
- Advertising is common in medical podcasts, and there is a need for guidance to manage conflicts of interest.

thousands of listeners per episode (Berk, Trivedi, et al. 2020; Rodman et al. 2021), and medical educators are

increasingly creating their own medical podcasts (Berk, Watto, et al. 2020).

Despite podcasts' growing role in health professions education, a search of the literature could not find studies that have systematically assessed the didactic methods employed by podcasts. Medical podcasts have been compared to traditional lectures in that they provide largely one-way knowledge transfer with limited ability to employ active learning principles (Kaplan et al. 2020). But podcasts may do more than simply transfer information from the host to a passive listener. Several different strategies, based on the understanding of adult learning theory and cognitive psychology, have been proposed to increase listener engagement in lecture formats (Cooper and Richards 2017). There is evidence that some of these strategies (e.g. the use of interpolated questions) can successfully increase knowledge acquisition among podcast listeners (Weinstock et al. 2020). In addition to transferring knowledge, podcasts may encourage learners to critically appraise the means of knowledge production (*via* reviews of primary literature) or apply knowledge to clinical cases (*via* case-based learning). Due to the lack of literature on this topic, however, it is unclear whether these strategies are used in medical podcasting.

The primary aim of this study is to systematically describe the pedagogical approaches employed by the 100 most popular medical podcasts in the United States. In particular, we aim to assess the extent to which successful podcasts engage listeners' ability to critically appraise primary literature or apply information to clinical cases, as opposed to relying on pure lecture formats.

Our secondary aim is to characterize the referencing and peer review practices, formats, affiliations, advertising practices, and CME offerings of these podcasts. To our knowledge, these attributes have not been previously reported in the literature. A rigorous assessment of these factors is needed to address concerns surrounding the lack of quality control mechanisms or safeguards against conflicts of interest in podcasting (Rodman and Trivedi 2020).

Methods

Twenty-eight months of Apple Podcasts (Apple, Cupertino, CA, USA: https://www.apple.com/apple-podcasts/) charts in the Medicine category in the United States were extracted *via* the podcast data aggregator Chartable, from 1 June 2018 through 30 September 2020 (Chartable 2021; New York, NY, USA). While Apple does not publicly disclose the algorithm it uses to generate podcast rankings, rank positions are determined by recent subscriber growth and total listenership, among other factors. To minimize the effects of Apple's algorithm, we averaged rank positions over the 28 months included in our study to generate a list of the 100 highest-ranked medical podcasts during this period.

We used Bloom's taxonomy as a framework to classify the pedagogical approaches employed by podcast creators. Bloom's taxonomy was originally developed to describe learning objectives in K-12 education, but it has been widely used to describe the cognitive processes employed by teachers in medical education, targeting increasing

cognitive skills by ascending to higher levels of the pyramid (Adams 2015; Branzetti et al. 2019). Rather than assessing formal learning objectives (which not all podcasts have), we developed and validated a scoring system that inferred learning methods from podcast formats. To develop the framework, three authors (AR, EZ, and NT) independently analyzed 30 podcasts. Based on emergent themes from our analysis, we developed a taxonomy of podcasting learning formats that corresponded to Bloom's taxonomy. Podcasts that employ cognitive processes, such as factual transfer of knowledge were ranked lower in our hierarchy relative to those that engage skills higher on the pyramid, such as integrating and applying concepts and deconstructing clinical biases. In our analysis, we did not find that podcasting formats corresponded to learning objectives from all six levels of Bloom's hierarchy; therefore, we collapsed them into a three-level hierarchy. Podcasts transferring knowledge in pure lecture format or *via* multiple-choice questions were ranked Level 1, those grounded in critical reviews of the primary literature Level 2, and those centered around the application of knowledge to a medical case Level 3.

In addition to the didactic method, we collected data on affiliation, target audience, format, advertising, CME credit offerings, and the presence of a reference list or verifiable review process. The coding schema was developed by independently analyzing 30 podcasts by each of the authors and then developing a consensus codebook. The codebook was then used to code ten additional podcasts; disagreements were discussed, and iterative changes were made to the codebook until all three coders agreed. After validating the codebook, the 100 highest-ranked podcasts were independently coded on these characteristics by two coders, and the third resolved disagreements. If there were uncertainties, an extensive discussion between all members took place until an agreement was made. To collect this data, coders reviewed the description provided by the creators, the podcast's website when available, and the first 5 min of the five most recent episodes of each podcast.

Affiliation was determined by classifying the podcast creator within the following categories: unaffiliated individual or group of individuals, medical journal, professional school, residency training program, or private company. The target audience was determined by listening to podcasts as well as reviewing their learning objectives and corresponding websites when available. While many podcasts explicitly identify their intended learner (e.g. Emergency Medicine residents), others were more ambiguous. In those instances, coders drew inferences from all available information, including the nature and level of complexity of presented topics and references to licensing examinations. Formatting was divided into the following categories: monologue when a single person spoke on a subject to convey information; expert interviews when a podcast host interviewed different field experts for each episode; and conversation when hosts discussed and contributed equally to the topic at hand. Most podcasts used one format while a few used a variety; in the latter cases, we coded based on the majority of episodes that fit a particular educational format. A podcast was deemed to take advertisers if an advertisement was found in its pre-roll, within the first

Table 1. Target audience of podcasts intended for physician education (PIPE), by specialty.

Specialty	No.	(%)
All specialties	13	(25.5%)
Emergency medicine	11	(21.6%)
Pediatrics	5	(9.8%)
Internal medicine	5	(9.8%)
Psychiatry	4	(7.8%)
Critical care medicine	4	(7.8%)
Cardiovascular medicine	2	(3.9%)
Surgery	2	(3.9%)
Family medicine	2	(3.9%)
Anesthesiology	1	(2.0%)
Neurology	1	(2.0%)
Obstetrics and gynecology	1	(2.0%)

Figure 1. Didactic level employed by medical education podcasts. *Note.* Level 1: pure lecture format or multiple-choice questions; Level 2: critical review of primary literature; Level 3: application of knowledge to a medical case.

5 min of an episode, or on its website. Referencing was defined as the presence of a list of references for one or more of the five most recent podcasts.

Coding was performed in Qualtrics (Qualtrics, Provo, UT, USA) and analyzed in R (R Foundation for Statistical Computing, Vienna, Austria). Descriptive statistics were generated for all data collected. Because physicians comprise a specific community of practice—with a set of expectations and educational norms distinct from those of the general public or other professions, such as nursing and physical therapy—we compared the characteristics of Podcasts Intended for Physician Education (PIPE) with those of podcasts intended for other audiences. We used Chi-Square tests to compare the two podcast groups with regard to affiliation, format, peer review process/referencing, CME credits, and advertising. Given that didactic level is an ordinal variable, a two-sided Mann–Whitney U test was conducted on this outcome.

Results

Of the 100 most popular medical podcasts in the United States, 91 are educational. Of the 91 educational podcasts, 41 are intended solely for physician education, 10 are intended for the education of physicians as well as other health professions (advanced practice providers, nurses, and pharmacists), and 40 are intended for other audiences. We categorized any podcast intended for physician education as a PIPE, whether or not it is also intended for another audience. Of the medical specialties represented in PIPEs, 'all specialties' are the most common (13) followed by emergency medicine (11), pediatrics (5), internal medicine (5), psychiatry (4), and critical care medicine (4) (Table 1). The audiences of the non-PIPE podcasts include the general public (19), nurses (11), physical therapists (4), advanced practice providers (2), as well as dentists, occupational therapists, paramedics, and pharmacists (1 podcast each).

Compared to podcasts intended for other audiences, PIPEs engage higher levels of Bloom's taxonomy ($p < 0.001$). 31 (60.8%) PIPEs employed Level 1 didactic methods, while 6 (11.8%) and 14 (27.5%) used Level 2 and 3 didactic methods, respectively. In comparison, 39 (97.5%) podcasts intended for other audiences employed Level 1 didactic methods, with 1 (2.5%) using Level 3 didactic methods (Figure 1).

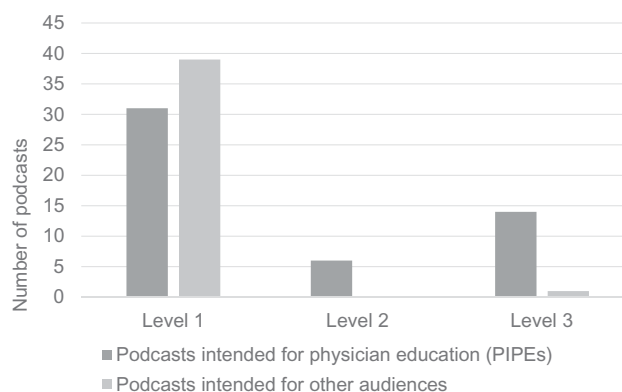PIPEs are most often affiliated with individuals ($n = 18$, 35.4%), companies ($n = 16$, 31.4%), or professional journals ($n = 12$, 23.5%) (Table 2). Less than 10% of PIPEs are affiliated with a professional society (3), university (1), or residency training program (1). The majority of PIPEs are targeted toward all levels of learners ($n = 38$, 74.5%), while the remainder is targeted specifically toward pre-medical students (1), medical students (4), residents, and fellows (1), and attending physicians (8). PIPEs are significantly more likely to have a peer review process in place or share a list of references for each episode ($n = 37$, 72.5% *vs.* $n = 15$, 37.5%, $p < 0.001$). They are also significantly more likely to offer CME credits ($n = 20$, 39.2% *vs.* $n = 2$, 5.0%, $p < 0.001$). Advertising is less common in PIPEs than in podcasts intended for other audiences ($n = 19$, 37.3% *vs.* $n = 24$, 60.0%), although this difference was not statistically significant.

Discussion

Our research shows that medical podcasting in the United States represents far more than a simple transfer of knowledge. Podcasts employ a wide variety of didactic methods, including those ranked highly on Bloom's taxonomy. They are often formatted in a method designed to engage higher-level cognitive skills by inviting listeners to apply their knowledge to the specificities of a medical case or to critically evaluate new research findings and assess their relevance to clinical practice. One surprising finding of our research is that podcasts intended for physicians appear to employ more complex cognitive teaching methods when compared with medical podcasts designed for other health professions and the general public. This suggests that physician podcasters are incorporating adult learning theory when writing episodes, though an alternative explanation might be that podcasts using these methods achieve higher rankings due to popularity with listeners. Other potential causes of our findings include differences in the level of proficiency or knowledge in content areas, areas of learning emphasis, or goals of educational training. Further research is necessary to elucidate the cause and significance of this finding.

Very few medical podcasts were aimed at specific learning levels: the majority intentionally targeted audiences from medical students to attendings, suggesting a flattening of learner hierarchies with educators intentionally crafting podcasts to be accessible by a broad array of learners.

Table 2. Characteristics of podcasts intended for physician education *vs.* podcasts intended for other audiences.

| | Podcasts intended for physician education* | | Podcasts intended for other audiences | | |
| | (n = 51) | | (n = 40) | | |
	No.	(%)	No.	(%)	p-Value**
Didactic method					**<0.001**
Level 1	31	(60.8)	39	(97.5)	
Level 2	6	(11.8)	0	(0)	
Level 3	14	(27.5)	1	(2.5)	
Affiliation					**0.03**
Company	16	(31.4)	21	(52.5)	
Individual	18	(35.2)	15	(37.5)	
Journal	12	(23.5)	0	(0)	
University	1	(2)	1	(2.5)	
Professional society	3	(5.9)	3	(7.5)	
Residency training program	1	(2)	0	(0)	
Format					0.57
Monologue	18	(35.3)	16	(40)	
Expert interview	16	(31.4)	14	(35)	
Conversation	17	(33.3)	9	(22.5)	
Narrative	0	(0)	1	(2.5)	
Peer review process or references listed					**<0.001**
Yes	37	(72.5)	15	(37.5)	
No	14	(27.5)	25	(62.5)	
CME offerings					**<0.001**
Yes	20	(39.2)	2	(5)	
No	31	(60.8)	38	(95)	
Advertisements					0.05
Yes	19	(37.3)	24	(60)	
No	32	(62.7)	16	(40)	

*Including ten podcasts intended for physicians and other audiences.
**p-Values were calculated using the chi-square test except for didactic methods, where the Mann–Whitney *U* test was used. p-Values below the significance level 0.05 are bolded.

Furthermore, our findings suggest a 'democratization' of the production and dissemination of medical education content. Only a small percentage of the podcasts included in our study were produced by traditional medical educational institutions, such as universities, post-graduate training programs, and professional societies. The majority were produced by unaffiliated individuals or companies. This is consistent with the idea of 'organic digital education,' which holds that the success of modern medical podcasts is due to complex interactions between learners and educators, rather than the perceived needs of large traditional institutions (Rodman and Trivedi 2020).

Despite concerns about quality control, source citation and peer review were common in PIPEs. We intentionally adopted a broad definition of peer review, but further research is needed to verify the quality and veracity of educational content shared through podcasts.

Advertising was very common in PIPEs. While many advertisements did not present obvious conflicts of interest—for example, advertisements for professional society meetings, CME courses, and test prep courses—some podcasts included advertisements for drug and medical device companies, raising the possibility of bias. As medical podcasting grows more popular and podcast creation becomes more onerous, more advertising money will undoubtedly flow its way. Our findings suggest the need for guidelines to manage conflicts of interest in medical podcasts.

Our findings are not without limitations. First, it should be noted that our classification schema inferred learning objectives based on the teaching format. While this is similar to in-person learning, where for example the format of a flipped classroom is generally considered to employ higher cognitive processes than a lecture, we did not attempt to classify formal learning objectives, let alone assess the listeners of podcasts to see what cognitive processes they engaged while listening. Future research needs to better clarify these distinctions. It is unclear if our algorithm for determining the top 100 medical podcasts in the United States precisely mirrors the rapidly changing landscape of podcast medical education. While Apple Podcasts charts are still the most frequently used and take into consideration subscriber growth and total listenership, their opaque generation raises the possibility of systematic bias—namely, that our sample may not reflect the most influential and sought-after clinical learning resources (Newman et al. 2021). In particular, our methodology excluded paid subscription podcasts unless they appeared as free samples since it only included podcasts publicly listed on Apple Podcasts. Information from subscription podcasts is not publicly available and could result in systemic undercounting, especially in the field of emergency medicine where subscription podcast use is common (Kalnow et al. 2021).

Our data suggest that the popularity of medical podcasting in the United States is potentially driven in part by the use of strategies driven by adult learning theory which engage higher levels of learning in listeners. Future research directions include examining causes for our finding of the discrepancy between medical podcast target audience and levels of Bloom's taxonomy; assessing the views of learners and content producers on the quality and veracity of medical education provided *via* podcasts, and rigorously evaluating conflicts of interests in podcasting with an eye toward constructing advertising guidelines.

Disclosure statement

(though not analyze) the data and helped with the understanding of the Apple Podcasts ranking algorithm. He had no part in the design or coding of the study.

Funding

Glossary

Digital education: Medical education in a digital, asynchronous format, such as podcasts, YouTube videos, or image sharing, that is consumed asynchronously and distributed through virtual communities of practice, often on social media.

Notes on contributors

Ellen Zhang, BA, Harvard Medical School, Boston, MA, USA.

Nicolas Trad, BA, Harvard Medical School, Boston, MA, USA.

Robert Corty, MD, Department of Internal Medicine, Vanderbilt University Medical Center, Nashville, TN, USA.

Dave Zohrob, BS, Chartable, New York, NY, USA.

Shreya Trivedi, MD, Harvard Medical School, Boston, MA, USA, Division of General Internal Medicine, Department of Medicine, Beth Israel Deaconess Medical Center, Boston, MA, USA, and Innovations in Media and Education Delivery (iMED) Initiative, Beth Israel Deaconess Medical Center, Boston MA, USA.

Adam Rodman, MD, MPH, Harvard Medical School, Boston, MA, USA, Division of General Internal Medicine, Department of Medicine, Beth Israel Deaconess Medical Center, Boston, MA, USA, and Innovations in Media and Education Delivery (iMED) Initiative, Beth Israel Deaconess Medical Center, Boston, MA, USA.

ORCID

Nicolas Trad http://orcid.org/0000-0001-7260-176X
Shreya Trivedi http://orcid.org/0000-0001-7183-0624
Adam Rodman http://orcid.org/0000-0001-8452-0692

References

Abate KS. 2013. The effect of podcast lectures on nursing students' knowledge retention and application. Nurs Educ Perspect. 34(3):182–185.

Adams NE. 2015. Bloom's taxonomy of cognitive learning objectives. J Med Libr Assoc. 103(3):152–153.

Berk J, Trivedi SP, Watto M, Williams P, Centor R. 2020. Medical education podcasts: where we are and questions unanswered. J Gen Intern Med. 35(7):2176–2178.

Berk J, Watto M, Williams P. 2020. Twelve tips for creating a medical education podcast. Med Teach. 42(11):1221–1227.

Bernstein E, Bhardwaj N, Pfoh ER, Yudelevich E. 2021. A nationwide survey of educational resource utilization and perception among internal medicine residents. J Gen Intern Med. 36(6): 1598–1604.

Blum CA. 2018. Does podcast use enhance critical thinking in nursing education? Nurs Educ Perspect. 39(2):91–93.

Branzetti J, Gisondi MA, Hopson LR, Regan L. 2019. Aiming beyond competent: the application of the taxonomy of significant learning to medical education. Teach Learn Med. 31(4):466–478.

Camp S. 2016. New resources-reviews and podcasts. J Nutr Educ Behav. 48(2):85.

Chartable. 2021. Podcast analytics & attribution; [accessed 2021 Aug 29]. https://chartable.com/.

Cooper AZ, Richards JB. 2017. Lectures for adult learners: breaking old habits in graduate medical education. Am J Med. 130(3): 376–381.

Kalnow A, Beck-Esmay J, Riddell J, Casey J, Carlson JN, Rezaie SR, Little A. 2021. Continuing medical education delivery preferences among physicians and advanced practice providers in emergency medicine. Cureus. 13(12):e20406.

Kaplan H, Verma D, Sargsyan Z. 2020. What traditional lectures can learn from podcasts. J Grad Med Educ. 12(3):250–253.

Little A, Hampton Z, Gronowski T, Meyer C, Kalnow A. 2020. Podcasting in medicine: a review of the current content by specialty. Cureus. 12(1):e6726.

Mallin M, Schlein S, Doctor S, Stroud S, Dawson M, Fix M. 2014. A survey of the current utilization of asynchronous education among emergency medicine residents in the United States. Acad Med J Assoc Am Med Coll. 89(4):598–601.

Newman N, Fletcher R, Schulz A, Andi S, Robertson C, Nielsen RK. 2021. Digital news report. Reuters; [accessed 2022 Mar 21]. https://reutersinstitute.politics.ox.ac.uk/digital-news-report/2021.

Rodman A, Abrams HR, Watto M, Trivedi S, Barbee J, Meraz-Munoz A, Fried MC. 2021. Medical podcasting in low- and middle-income countries: a needs assessment and vision for the future. Teach Learn Med. 1–7.

Rodman A, Trivedi S. 2020. Podcasting: a roadmap to the future of medical education. Semin Nephrol. 40(3):279–283.

Weinstock M, Pallaci M, Aluisio AR, Cooper B, Gottlieb D, Grock A, Frye A, Love JN, Orman R, Riddell J. 2020. Effect of interpolated questions on podcast knowledge acquisition and retention: a double-blind, multicenter, randomized controlled trial. Ann Emerg Med. 76(3):353–361.