


RESEARCH ARTICLE

Audio podcast and procedural video use in anaesthesiology and intensive care: A nationwide survey of Swedish anaesthetists

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Abstract

Background: Digital modalities which enable asynchronous learning, such as audio podcasts and videos demonstrating procedures, may benefit acquisition and retention of knowledge and clinical skills. The main objective of this nationwide cross-sectional survey study was to evaluate key aspects and factors related to usage of audio podcasts and procedural videos in anaesthesiology and intensive care.

Methods: A 20-item multiple-choice-question online survey was created through a consensus process including pilot testing among residents and consultants. Data were collected over a 3-month period, September–November 2023.

Results: The survey was completed by 466 anaesthetists. More than a third reported using procedural videos ≥ 1 time per week, whereas fewer than one in four participants used audio podcasts at least once per week. Multivariable logistic regression analysis showed that working at a university hospital, male sex, and younger age were independently associated with podcast use ≥ 1 time per week, with the highest odds ratio (OR) for younger age (<40 years vs. ≥ 40 years old; OR 5.86 (95% confidence interval 3.55–9.67), $p < .001$). Younger age was also significantly associated with higher frequency of video use (OR 1.71 (1.13–2.58), $p = .011$), while working predominantly in intensive care was associated with a lower frequency of video use. Podcasts were often used during commuting (42.3%), household work (30.7%), and exercise (24.9%), indicating a role in multi-tasking. Approximately half of respondents expressed that audio podcast-based learning has a moderate to very large positive impact on acquisition of theoretical knowledge, as well as practical skills. A vast majority, 85.2%, reported that procedural videos have a moderate to very large impact on development of clinical skills.

Conclusion: Audio podcasts and procedural videos are appreciated tools with potential to supplement more traditional didactic techniques in anaesthesiology and

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intensive care. Procedural video use is common, with perceived large effects on development of clinical skills. Further data are needed to fully understand learning outcomes, quality of peer-review processes, and potential sex-differences.

KEYWORDS

anaesthesiology, asynchronous, digital, intensive care, learning, podcast, video

Editorial Comment

Clinicians are finding different sources of educational material, and now for some, this includes material accessible as audio or video files, which can be accessed at the clinicians' convenience. A challenge in this respect is to be efficient in the educational gain by trying to find, identify, and use high quality material to advantage.

1 | INTRODUCTION

Digital methods which enable asynchronous education are increasingly used across clinical specialties.¹ These learning modalities, for example, audio podcasts and procedural videos, provide users the freedom to choose when and where to learn, and may facilitate a better balance between work and life in general for busy healthcare professionals. Importantly, web-based materials may provide a more authentic framing of clinical situations compared to traditional teaching methods such as lectures and seminars, with potential benefits related to acquisition and retention of theoretical knowledge and practical skills.^{2,3}

A survey conducted in 2010–2011 showed that more than half of anaesthesiology residents in Canada were using medical podcasts, although the findings were limited by a low response rate (24%).⁴ A recent survey from the United States found that approximately 36% of residents used podcasts 1–2 times per week or more.⁵ Ease-of-access and ability to multitask were highlighted by residents as main reasons for using podcasts in addition to other learning resources.

Similar to the advent of medical audio podcasts, videos demonstrating procedures such as tracheal intubation, central venous access, and peripheral nerve blocks have gained a large audience among practicing anaesthetists and intensive care physicians.⁶ According to comments provided in direct relation to procedural videos, users appear to appreciate the ability to better grasp key details, tips-and-tricks, and clinical pearls which can be hard to capture in conventional text formats. For example, demonstration of real-time needle redirections and visualization of gradual spread of local anaesthetics around nerve structures are relatively unique features of procedural videos. Moreover, the typical design and duration of these procedural videos (approximately 5–15 min) enable clinicians to integrate learning in a natural way in-between cases and tasks.

Although audio podcasts and procedural videos related to anaesthesiology and intensive care seem to be increasingly used by resident anaesthetists, no previous attempt has been made to evaluate usage patterns, perceived learning outcomes, and opinions/preferences of physicians with differing levels of experience on a nationwide level.

Moreover, there may be significant differences in use, and the purpose of use, between audio podcasts and procedural videos. Further, no study has evaluated whether procedural videos differentially impact clinical practice depending on provider experience. Given the rapid growth and widespread use of both audio podcasts and procedural videos for competency development and maintenance of knowledge in anaesthesiology and intensive care, the main objective of the current project was to evaluate key aspects and factors related to usage of these digital resources.

2 | METHODS

2.1 | Overview of study design

The current nationwide cross-sectional survey study aimed to evaluate key aspects of audio podcast- and procedural video-based learning among Swedish anaesthetists. Approval by the Swedish Ethical Review Authority was not deemed necessary, given that no collection or handling of sensitive or patient-related data was part of the study. This study was reported according to the Checklist for Reporting of Survey Studies (CROSS) (Appendix S1).⁷

2.2 | Main objectives

The main objectives of the study were to evaluate the following aspects and factors related to use of audio podcasts and procedural videos in anaesthesiology and intensive care:

1. frequency of use
2. usage patterns
3. perceived impact on development and maintenance of knowledge
4. perceived effect of simultaneous exercise on audio podcast-based learning
5. perceived effects on acquisition and retention of theoretical knowledge and practical clinical skills
6. advantages and disadvantages

7. identification and selection of audio podcasts and procedural videos
8. opinions related to assessment of reliability and trustworthiness
9. desired length of a procedural video.

2.3 | Process of survey creation

To identify topics for the survey, relevant literature, and previous surveys evaluating e-based learning methods in the field of anaesthesiology and intensive care, a comprehensive search of the PubMed database from inception to August 2023, using the words podcast(s) or video(s) in combination with either anaesthesiology, intensive care or critical care, was conducted. In addition, a manual search of reference lists of identified pertinent articles was performed. Upon creation of draft topics and questions, the first author invited experts (co-authors) within e-based learning and teaching in anaesthesiology and intensive care, for discussion and calibration of content. The group reached consensus on a version including five different domains (demographic/clinical background, usage patterns, usage preferences, perceived learning effects, and general opinions) with a total of 20 questions. Compared to the first draft survey version, five new questions were added, with eight additional response options added to three existing questions. The second version of the survey was then pilot tested among five anaesthesiology residents and five anaesthesiology consultants, in Lund and Uppsala. Comments and suggested changes to content and phrasing were actively requested, prior to finalization of the survey questions. Feedback to this version was overall positive, although one consultant thought the relatively high number of questions might reduce compliance, that is, lower the response rate. This consultant in particular highlighted questions 13–16 (related to advantages and disadvantages) as burdensome to complete. Moreover, feedback from another consultant and a resident resulted in rephrasing of one question and one response alternative. Upon completion of pilot testing, with subsequent amendments, the principal investigator circulated an updated draft of the survey in the expert group. No further changes were implemented, and the final version of the survey was approved by all members of the study team (Appendix S2, English version; Appendix S3, Swedish original version). Only the Swedish version of the survey was used throughout the study.

2.4 | Enrolment and data collection

The REDCap (Research Electronic Data Capture) electronic data capture tool hosted at Lund University, was used for data collection and management.^{8,9} Collection of data commenced on 2023-09-07, and ended 2023-11-30, extending over an *a priori* determined three-month period. A link to the survey was posted online on the webpage of the Swedish Society of Anaesthesiology and Intensive Care Medicine (SFAI, Svensk Förening för Anestesi och Intensivvård) [<https://sfai.se>]. Additional measures to increase enrolment

included: e-mail notifications about the study to colleagues, head of departments, director of studies for resident programs, subcommittees of SFAI, posts on three relevant closed group social media pages including only Swedish anaesthetist members, and local printed posters. Although the recruitment method aimed to target a random, representative sample of Swedish anaesthetists, selection bias cannot be excluded. No personally identifiable information was collected (i.e., the current work was based on an anonymous survey). Given that many anaesthetists share computers at their workplace, we implemented no limit regarding number of survey responses from a specific IP-address. There were no economic or other incentives to complete the survey.

2.5 | Statistical methods

Descriptive statistics were used to summarize data; results are generally presented as percentage of respondents. Data was visually inspected, often through creation of simple or clustered bar graphs, to guide use of relevant statistical models. Multivariable logistic regression models were used to obtain odds ratios (ORs)/ evaluate associations between dichotomous demographic factors (younger age, defined as <40 years vs. ≥40 years old; sex, male vs. female), workplace factors (university hospital vs. other workplaces, predominantly work in ICUs vs. other work situations), experience level (two different variables: <5 years (i.e., resident) vs. ≥5 years, and <10 years vs. ≥10 years) and binary outcome variables including frequency of audio podcast or procedural video use (≥1 time/week vs. <1 time/week) and different measures of usage patterns, and perception of reliability and trustworthiness of the learning tools. Given that independent variables age and experience level were highly correlated, these factors were evaluated in separate models, as appropriate. No variables used in the analyses were modified. Since complete data entry was a prerequisite for submission of survey responses, there were no missing data. The Hosmer–Lemeshow goodness of fit test was valid for all models (p -values >.05). Sample size was determined by the preplanned enrolment period; no power calculations were performed. A p -value <.05 was considered significant. Data management and analyses were conducted utilizing SPSS version 29.0 (IBM Corp., Armonk, NY).

3 | RESULTS

Four hundred and sixty-six anaesthetists completed the online survey. Given the sampling technique, it is not possible to calculate an absolute response rate. However, 466 responded and, for reference, SFAI currently has 1440 members. Basic demographic data including age distribution (according to five strata) and sex can be found in Table 1. Similar to experience level, a wide range of ages were included in the sample, although relatively few were below 30 years old ($n = 20$, 4.3%) or more than 60 years old ($n = 33$, 7.1%).

Data regarding workplace, main practice and experience level are provided in Table 1. The responses regarding practice reflect the fact that many anaesthetists in Sweden combine work in surgical departments (operating room) and in different intensive care units. Anaesthetists working in university hospitals were slightly oversampled (56.0%) compared to other types of hospitals. Varying levels of experience were well-represented, including a substantial number of

residents ($n = 115$, 24.7%) as well as very experienced anaesthetists (>15 years practice, $n = 164$, 35.2%).

3.1 | Audio-podcast based learning in anaesthesiology and intensive care

3.1.1 | Frequency of audio podcast use

Frequency of audio podcast use is shown in Figure 1. Fewer than one in four participants (23.2%) reported using audio podcasts at least once per week. In a multivariable logistic regression model, working at a university hospital (OR 1.66 (95% CI 1.02–2.69), $p = .041$), younger age (<40 years old; OR 5.86 (3.55–9.67), $p < .001$), and male sex (OR 2.74 (1.65–4.53), $p < .001$) were independently associated with audio podcast use ≥ 1 time per week, with the highest odds ratio for younger age. Given that young age and lower experience level are highly correlated, both variables were not included in the model simultaneously, but results were similar when age was exchanged with experience level.

3.1.2 | Pattern of audio podcast use

Audio podcasts were most commonly used while commuting to and from work (42.3%), during household work (30.7%), and during exercise (24.9%), indicating a role in multi-tasking. Almost one out of five (19.7%) reported podcast use in “other situation”, not further specified in this survey. Less than 10% reported using audio podcasts during daytime rest periods (9.4%) or in bed before falling asleep (4.3%). Younger age (<40 years) was associated with use of audio podcasts during exercise, household work and commuting; additionally, male sex was associated with audio podcast use during commute (Table 2).

3.1.3 | Impact of audio podcast-based learning on development and maintenance of knowledge

Results regarding the beliefs of which impact audio podcast use has on development and maintenance of both theoretical and practical

TABLE 1 Basic characteristics of survey respondents ($n = 466$).

Demographic or workplace characteristic	<i>n</i>	%
Workplace		
University hospital	261	56.0
County hospital	156	33.5
Small county hospital	41	8.8
Private unit	7	1.5
Other	1	0.2
Main practice		
Surgical department	153	32.8
Intensive care unit	71	15.2
Approx. same amount operating room and ICU	234	50.2
Other	8	1.7
Experience level		
<5 years (i.e., resident)	115	24.7
5–10 years	112	24.0
10–15 years	75	16.1
>15 years	164	35.2
Age		
<30 years	20	4.3
30–40 years	185	39.7
41–50 years	148	31.8
51–60 years	80	17.2
>60 years	33	7.1
Sex		
Female	194	41.6
Male	266	57.1
Does not wish to specify	6	1.3

Abbreviation: ICU, intensive care unit.

Frequency of audio podcast and procedural video use

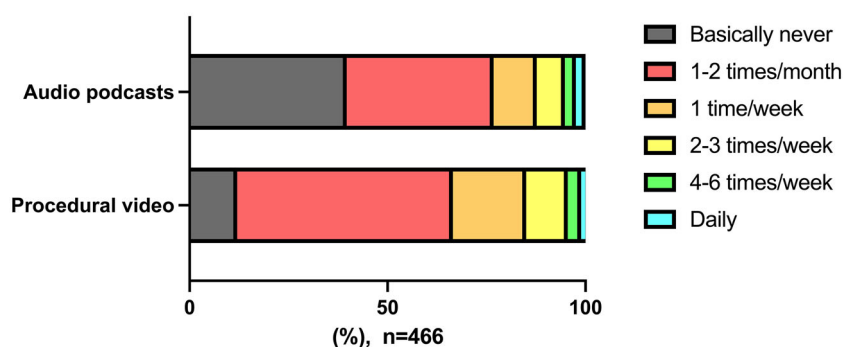


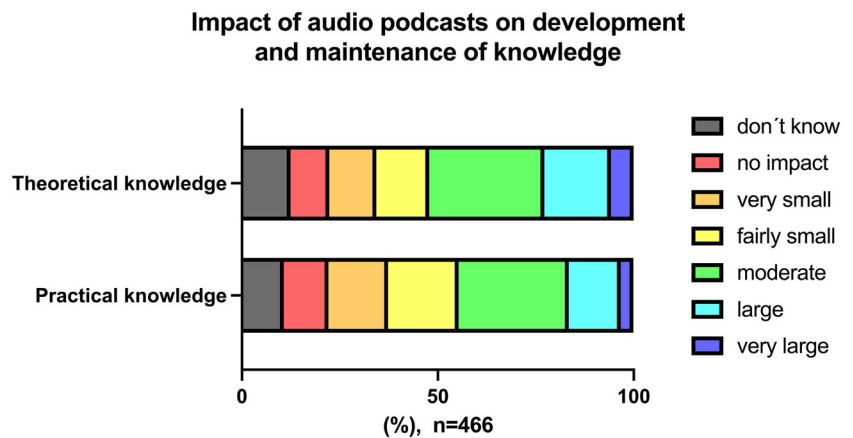
FIGURE 1 Frequency of audio podcast and procedural video use.

TABLE 2 Multivariable logistic regression analyses: associations between demographic factors, workplace and pattern of audio podcast use.

	Podcast use during exercise		Podcast use during household work		Podcast use during commute to/from work	
	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p
Younger age ^a	2.34 (1.51–3.61)	<.001	2.95 (1.94–4.47)	<.001	3.34 (2.25–4.97)	<.001
Sex: male	1.18 (0.76–1.82)	.47	1.50 (0.98–2.29)	.06	1.65 (1.10–2.46)	.015
Workplace university hospital	1.08 (0.70–1.67)	.72	0.91 (0.60–1.37)	.64	1.20 (0.81–1.77)	.37

^a<40 years versus ≥40 years old.

Abbreviations: CI, confidence interval; OR, odds ratio.

FIGURE 2 Perceived impact of audio podcasts on development and maintenance of knowledge.

knowledge are presented in Figure 2. Notably, more than half (52.2%) indicated that audio podcast-based learning has a moderate to very large positive impact on acquisition of theoretical knowledge, with a similar proportion (44.6%) indicating this effect related to practical knowledge and skills.

3.1.4 | The perceived effect of simultaneous exercise on audio podcast-based learning

Results related to perceived impact of simultaneous exercise on audio podcast-based learning was mixed with 22.4% indicating no to very negative effect (no effect 5.4%, negative effect 12.7%, and very negative effect 4.3%), 23.8% indicating a positive effect (some positive effect 16.3%, very positive effect 7.5%), whereas approximately one out of three (29.6%) expressed uncertainty regarding exercise-associated effects on learning. Multivariable logistic regression analyses showed no significant associations between younger age, sex, experience level, workplace and perception about the effects of exercise on audio podcast-based learning.

3.1.5 | Perceived advantages and disadvantages of audio podcast-based learning

The top three advantages according to respondents were availability (70.2%), that is, being able to choose when and where to listen, the possibility to pause and repeat episodes (60.7%), and the ability to

multi-task (42.1%), that is, do other things simultaneously. Additional advantages were the presence of updated, relevant content (41.0%), and the opinion that podcasts may enhance learning compared to other more traditional educational formats (25.5%). Only 10 respondents (2.1%) failed to see any real advantages associated with audio podcasts in this setting. Among perceived disadvantages, the following were reported as the three leading factors: being easily distracted (37.1%), unreliable content (32.8%), and difficulties finding the desired content (27.9%). Moreover, 10.1% acknowledged too many breaks for commercials, and 9.0% expressed concerns about too many advertisements for courses/congresses in which the producers of the audio podcasts are involved. Whereas 15.5% expressed that they do not see any real disadvantages with audio podcasts, 9.7% found that audio podcast-based learning is less effective compared to more traditional formats.

3.2 | Procedural video-based learning in anaesthesiology and intensive care

3.2.1 | Frequency of procedural video use

Frequency of procedural video use is shown in Figure 1. In contrast to audio podcast use, few respondents expressed never using videos (11.6%). More than a third (33.7%) reported using procedural videos at least once per week. Video use was least common among anaesthetists working predominantly in intensive care units, as shown by multivariable logistic regression analysis evaluating the association between main workplace (intensive care vs. others) and the dichotomous

variable procedural video use ≥ 1 time/week versus < 1 time/week (OR 0.25 (0.11–0.54), $p < .001$), adjusting for sex, type of hospital, and age. In the same model, younger age was also significantly associated with a higher frequency of video use (OR 1.71 (1.13–2.58), $p = .011$).

3.2.2 | Impact of procedural videos on development of clinical skills

A significant majority of anaesthetists (85.2%) reported that procedural videos have a moderate to very large impact on the development of clinical skills (moderate 34.1%, large 38.2%, and very large 12.9%), whereas only 0.9% reported no such effect. The remaining responses were distributed as: very small impact 3.9%, fairly small impact 7.3%, and 2.8% expressed no knowledge of the potential impact on their skillset.

3.2.3 | Perceived advantages and disadvantages of procedural video-based learning

Three main advantages of procedural video-based learning were highlighted by respondents: availability (83.9%), ability to pause and replay (83.9%), and the fact that videos add a dimension which is hard to capture through other modes of teaching (61.4%). Other advantages included presence of updated, relevant content (47.4%), and the belief that video-based learning is more effective compared to other more traditional formats (35.2%). Only two respondents (0.4%) failed to see any advantages. Main perceived disadvantages included: unreliable information (26.4%), not being able to find the desired content (26.0%), poor quality leading to premature termination of the video (22.5%), too many commercial breaks (10.9%), and being easily distracted while watching (10.3%). A high proportion, 40.1%, expressed that they saw no real disadvantages with video-based learning.

3.2.4 | Desired length of a procedural video

According to respondents, very few prefer procedural videos exceeding a length of 10 min (7.7%; 10–15 min 7.1%, 15–30 min 0.6%). More than half preferred a video duration of 5–10 min (51.9%), and 35.8% thought that less than 5 min is the ideal format. There were no clear associations between demographic factors, level of experience, and desired video length.

3.3 | Data related to both audio podcast- and procedural video-based learning

3.3.1 | Identification and selection of audio podcasts and procedural videos

The two most common ways of finding an audio podcast or procedural video were tip from colleague (67.6%) and use of an online

search engine (65.0%). Other ways included tip from other audio podcast/procedural video (29.8%), tip during other teaching activity (23.4%), tip from social media (20.4%), and tip in chatforum (2.8%).

3.3.2 | Reasons for listening to audio podcasts or watching procedural videos

There were four main reasons for anaesthetists to use audio podcasts and procedural videos, each reported by approximately 60% of anaesthetists: to gain or update basic knowledge in anaesthesiology and intensive care (59.2%), to update knowledge regarding new findings in anaesthesiology and intensive care (57.5%), to learn new clinical skills (61.2%), and to update clinical skills (63.3%). Additionally, 20.2% reported using these media for entertainment, or other unspecified purposes (1.7%).

3.3.3 | Assessment of reliability and trustworthiness of audio podcasts and procedural videos

Four factors were reported to be of greatest importance in the assessment of reliability and trustworthiness of audio podcasts and procedural videos: the reputation of the institution (59.0%), the creator's reputation (55.6%), recommendation from a colleague whom the anaesthetist trusts (47.9%), and reviews (17.4%). Less important factors were number of listenings/views (12.7%), the presenters' enthusiasm or engagement (9.0%), and the title (7.5%). A substantial minority, 15.9%, expressed not knowing how they determine reliability/trustworthiness. Interestingly, multivariable logistic regression analyses, adjusting for sex and type of workplace, showed that younger age (< 40 years old) was associated with selecting the following factors as important for the determination of reliability and trustworthiness: the creator's reputation, tip from colleague, number of listenings/views, and reviews. In the same type of model, female sex was independently associated with selecting the presenters' enthusiasm/engagement as a factor underlying the determination of reliability (OR 2.05 (1.01–4.14), $p = .047$), and male sex was associated with selection of tip from colleague whom the anaesthetist trusts (OR 1.64 (1.12–2.40), $p = .011$).

4 | DISCUSSION

4.1 | Main findings

In this nationwide survey of anaesthetists, we found relatively widespread use of procedural videos, whereas only 23.2% used audio podcasts at least once per week. Use of audio podcasts was more common among younger, male anaesthetists working at a university hospital. Younger age was also associated with more frequent video use. Interestingly, those working predominantly in intensive care used

procedural videos more seldom, compared to anaesthetists working in a surgical department or a combination of workplaces. Our data indicate that audio podcasts are typically used in the setting of multi-tasking. Opinions related to the effects of simultaneous exercise on learning outcomes were mixed, with approximately one out of three expressing uncertainty regarding the direction of effect. A vast majority reported a perceived positive impact of procedural videos on development of clinical skills. Perceptions related to learning effects associated with audio podcast use were more uncertain, but about half of respondents reported a moderate to very large impact on acquisition of theoretical knowledge and practical skills. Availability, and the ability to freely pause and replay episodes and clips were highlighted as important advantages for both audio podcasts and procedural videos. Unclear reliability, difficulties finding the desired content and quality issues were examples of disadvantages.

4.2 | Audio podcast- and procedural video-based learning in the context of previous research

Several review articles and surveys have evaluated different aspects of audio podcast-based learning. Based on multiple studies, the number of audio podcasts in various medical and surgical specialties has increased dramatically over the past decade and a half.¹ Whereas audio podcast-based education may be more common in specialties such as internal medicine and emergency medicine, the availability of audio podcasts in anaesthesiology is relatively high (ranked seven out of 25 in an analysis of audio podcast platforms).¹ Previous surveys from Canada and the United States have shown that at least one out of three anesthesia residents use audio podcasts on a weekly basis to enhance learning.^{4,5} In the present study, numbers were even higher with 42.5% of residents listening to podcasts at least once per week. Moreover, beyond younger age, we identified two further factors predictive of podcast use: male sex and working at a university hospital. To our knowledge, the influence of sex on audio podcast use has not been previously shown and warrants further exploration. Although no systematic review has investigated distribution of sex among podcast creators, there appears to be a male preponderance in the field of anaesthesiology and intensive care podcasts; we speculate that podcasts created by male anaesthetists might have a wider appeal to men. Additionally, potentially sex-related factors, such as part-time work, commute patterns, and opportunity for leisure time, could influence the use of podcasts. It is possible that the increased focus on teaching and awareness of directions and trends regarding digital asynchronous learning methods at university hospitals directly lead to increased audio podcast use, although these findings merit confirmation. An international online survey including 390 participants, representing four professions in emergency and critical care medicine, found that the main reasons for listening to medical audio podcasts were to review new literature, learn core material and refresh memory.¹⁰ Notably, the vast majority (93.6%) reported performing other tasks, such as driving, exercising, and completing chores, while listening to podcasts. These results are in line with our findings, which

confirm that audio podcasts are typically used while multi-tasking, possibly contributing to a better work–life balance. Interestingly, attentional engagement in audio podcast listening may be increased as a function of environmental context, as shown in a recent publication.¹¹ For example, audio podcast listeners ($n = 264$) expressed feeling more actively engaged in the listening experience during exercise, being outdoors or at home, as compared to in an environment with high levels of background noise, or at work.

In addition to studies examining usage patterns and preferences related to audio podcast listening, a few studies have experimentally probed learning outcomes. For example, in a pilot study including 10 anaesthesiology residents,¹² and a subsequent larger study including 21 anaesthesiology residents and 12 medical students,² an audio podcast designed to increase electroencephalography (EEG) knowledge, was found to be as effective,¹² or more effective,² compared to conventional didactics to attain EEG interpretation goals. Interestingly, individuals with more prior audio podcast experience showed greater increases in EEG interpretation scores. In a randomized study including 130 medical students, audio podcasts were shown to achieve better learning outcomes as compared to textbook reading, related to orthopedic diseases.¹³ A recent study by Wolpaw et al. confirmed that audio podcast listening may enhance learning and retention of knowledge compared to textbook reading.³ Interestingly, in this study, there were no differences in learning when comparing audio podcast listening during exercise on a treadmill to audio podcast listening in a seated position. The potential learning benefits of audio podcast use compared to textbook reading may however be limited to certain topics, since there were no differences between the learning conditions for one out of three studied topics (statistics). Interestingly, in our study, results regarding the perceived learning effects associated with audio podcast use were more mixed compared to video-based learning, for which >85% clearly indicated a strong impact. Finally, another important advantage of audio podcast use may be development of medical English vocabulary, in particular in countries where English-language fluency is relatively low.¹⁴

Although there are several advantages associated with audio podcast-based learning and procedural videos, there are disadvantages which limit the use of these methods. For example, judgement of the trustworthiness and reliability of the content may be complicated.¹⁵ Indeed, in our study, 15.9% responded that they do not know how to make the judgment. Overall, there are very limited data regarding which type of peer-review, if any, is applied prior to release of podcasts or videos. Whereas peer-review, defined as "...created in the context of a publication, presence of three or more speakers, grand rounds, and association with a journal or university" is applied to more than 70% of anaesthesiology podcasts,¹⁶ the process may not be as transparent or meticulous as for established journals. In contrast, whereas post-publication critique and concerns related to articles published in traditional journals may be expressed in the format of a letter-to-the-editor or correspondence article, producers of digital resources such as podcasts and videos often supply chat forums which allow rapid dissemination of comments and critique, in addition to other social media. There is an ongoing debate regarding potential

risks and benefits related to use of social media and podcasts created by “expert celebrity” in emergency medicine, anaesthesiology and intensive care.¹⁷ Our data confirm that the creator’s reputation is an important factor in the judgment of reliability, in addition to the reputation of the institution, and other “soft” variables such as recommendation from a colleague and user reviews. Another disadvantage brought forward was difficulty finding podcasts or procedural videos covering a particular topic. In contrast to our expectations, commercial breaks and advertisements, especially promoting the publisher’s own conferences and courses, were not highlighted as particularly burdensome.

4.3 | Limitations

This work has a number of limitations which should be considered. Most importantly, we only focused on two of the most commonly used methods of asynchronous learning in anaesthesiology and intensive care, that is, audio podcasts and procedural videos. Inclusion of other modalities, such as chat forums and blogs could have contributed to our survey. Nevertheless, to enhance compliance, the extent of a survey designed for online nationwide distribution must be limited. Based on previous experience with this type of survey,¹⁸ it is difficult to expand beyond 20 questions. Even though the survey only addressed audio podcasts and procedural videos, some domains could have been examined in greater detail; for example, we were not able to include questions regarding which topics or content users prefer or would like to see covered in the future. Moreover, as for surveys in general, there might be limitations relating to the phrasing of questions and selection of multiple-choice answers. Unfortunately, due to practical constraints, the recruitment method could not target all practicing Swedish anaesthetists in a definitive manner to ascertain true representativeness of the sample, and to estimate response rate. We acknowledge that it is difficult to exclude an element of selection bias, given that a survey about podcasts and procedural videos might differentially attract responses from people who are more likely to use technology in their learning and practice. Anaesthetists working in university hospitals were somewhat overrepresented compared to county hospitals, which might have impacted results. However, distribution of age, sex, and experience level showed adequate representativeness of Swedish anaesthetists.

5 | CONCLUSIONS

Audio podcasts and procedural videos are appreciated learning tools with potential to supplement more traditional didactic techniques in anaesthesiology and intensive care. Procedural video use is common, with perceived large effects on development of clinical skills. Further data are needed to fully understand the impact on learning outcomes, identify which topics are best suited for e-learning, how to optimize delivery of content, evaluate peer-review processes, and investigate potential sex-differences related to podcast use.

AUTHOR CONTRIBUTIONS

Study conception: MFB. Study design: all authors. Data collection: MFB, OB. Data analysis: MFB. Interpretation of results: all authors. Draft manuscript preparation: MFB. All authors reviewed the results and approved the final version of the manuscript.

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CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest to declare.

DATA AVAILABILITY STATEMENT

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

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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