

Reviving the medical lecture: practical tips for delivering effective lectures

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► Additional supplemental material is published online only. To view, please visit the journal online (<http://dx.doi.org/10.1136/rapm-2021-103401>).

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Received 8 December 2021
Accepted 25 January 2022
Published Online First
11 February 2022

ABSTRACT

Large group lectures, which are widely used in continuing medical education, are susceptible to pitfalls that can negatively impact their effectiveness. In this article, we describe evidence-based best practices from the educational literature that can revive the medical lecture as an effective educational tool. We provide practical tips for both developing and delivering lectures, emphasizing the key role that learning objectives can and should have in the development of lectures, the importance of organization, effective use of visuals and application of restraint in slide design. Pause techniques to authentically engage the audience are described. We also provide practical tips for promoting attention in virtual presentations.

INTRODUCTION

Since the inception of continuing medical education, lectures have remained the primary format for sessions at medical conferences and meetings. This honor is not necessarily bestowed because lectures are the best way for attendees to learn new material—in fact, other session formats are preferable if the goal is to promote critical thinking, teach new procedures or change learners' attitudes.¹ Alternatively, the benefits of large group lectures include efficiency since they can inform a large group of learners and provide a focus for shared learning.

Unfortunately, large group lectures are susceptible to pitfalls that can derail the educational process. These pitfalls include 'death by PowerPoint',² where the presenter has crammed so many slides into a time frame so short that you scarcely have a moment to register a slide before they have moved to the next one. We have all experienced the pitfall of a presentation where you are talked at, rather than talked to, leaving you to wonder the benefit of attending in-person and if watching a video of the presentation where you could at least watch it at a speed of 1.5 × or more is preferable. Now with the COVID-19 pandemic and the abrupt shift towards virtual remote learning, this temptation is even greater. This is an opportune time to resurrect and optimize the medical lecture compared with previous practices.

Fortunately, the educational literature can provide insight into improving the development and delivery of medical lectures. The medical lecture can be revived, and in this manuscript, we provide the reader with nine evidence-based practical tips from the education literature that can improve the quality and efficacy of your next lecture, whether 10 min or 90 min long (figure 1). We will first

provide tips for development of the presentation and then for delivery of the presentation.

LECTURE DEVELOPMENT

Tip #1: Start with strong learning objectives

While writing learning objectives may not be the most appealing aspect of preparing a presentation, objectives are critical to lecture development. The ideal learning objectives clearly communicate to the audience what they should be able to *do* after your presentation.³ Think about your target audience, what their baseline knowledge and goals are, and tailor your learning objectives to what is most important for them to take away from your presentation.

In our experience, presenters overlook this advice, and it can lead to a less effective presentation. Learning objectives are more likely to be achieved when they are Specific, Measurable, Attainable, Relevant and Time-bound (S.M.A.R.T.; see <https://sites.google.com/site/writinggoodlearningobjectives/home/making-learning-objectives-smart>). Bloom's Taxonomy⁴ can be used to target the appropriate cognitive level of learning that you want your audience to achieve. The level of Bloom's Taxonomy to target may depend on the format of your educational session, desired goals for session, as well as your audience's baseline knowledge in the topic. For example, when introducing a new regional block lacking studies of its effectiveness, objectives with high Bloom's Taxonomy levels of analyze, evaluate or create would be a mismatch. Similarly, a lecture format may not be appropriate if your objective is for learners to demonstrate a technique.

Objectives require active verbs, examples which can be found at many sites such as <https://sites.google.com/site/writinggoodlearningobjectives/home/categories-of-learning-and-learning-objectives/the-cognitive-domain>. Avoid selecting ambiguous verbs such as 'understand,' 'review,' 'appreciate,' 'know,' 'learn,' 'improve,' 'approach,' and 'become;' they are vague and open to interpretation and cannot be measured or observed. When crafting your learning objectives, start with 'By the end of this presentation, the learner will be able to...' and should answer the following question, 'Who will do how much of what by when?'³ Consider the following learning objective, 'The attendee will improve their knowledge of Pecs and paravertebral blocks.' This learning objective is vague and does not communicate clearly with the learner that they should be able to do after the presentation. A more effective learning objective would be, 'At the end of



► <http://dx.doi.org/10.1136/rapm-2022-103540>



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To cite: Harbell MW, O'Sullivan PS. *Reg Anesth Pain Med* 2022;**47**:331–336.

9 Tips for Developing and Delivering Lectures

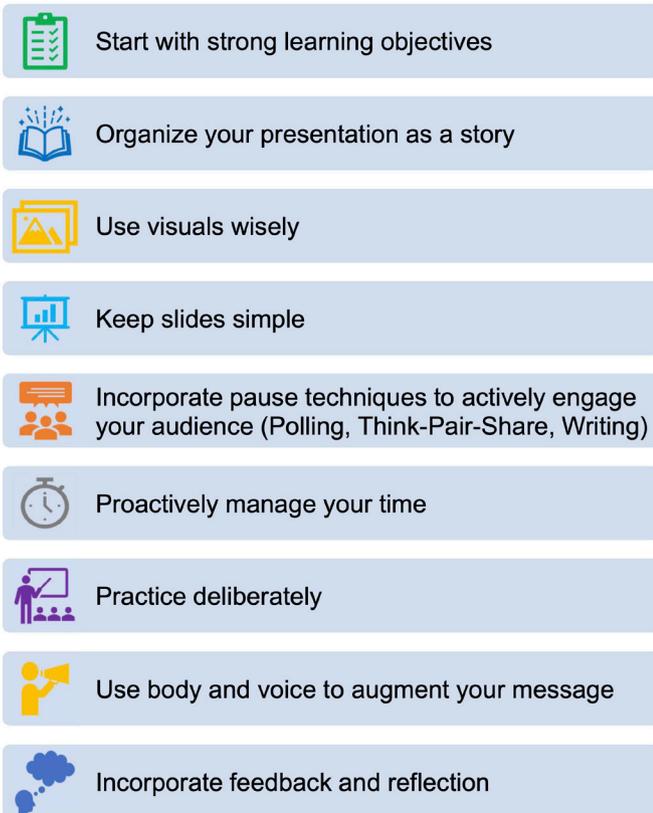


Figure 1 Nine tips for developing and delivering lectures.

this session, the attendee will be able to contrast the use of Pecs block and paravertebral block in at least three patient scenarios.’ This new learning objective answers the question ‘Who will do how much of what by when?’ as well as provides a framework for the presentation, where different patient scenarios can be presented that compare and contrast the use of pecs and paravertebral blocks.

When learning objectives are written before preparing lecture content, they enhance the efficiency of the development process. Strong learning objectives focus the presentation only on the material that is necessary to achieve the learning objectives, thereby, saving time and energy in preparing unnecessary slides or trying to cover too much. Learning objectives are helpful to refer to when deciding what slides should make it into the final presentation. Strong learning objectives also influence the form of assessment. For the Pecs and paravertebral blocks objective, the assessment would consist of presenting the attendee with a clinical scenario that they could discuss the pros and cons of using a Pecs rather than a paravertebral block.

Tip #2: Organize your presentation as a story

The organization and structure of a presentation help communicate your message. All presentations have a beginning, middle and end. In the beginning, you ‘setup’ your presentation by sharing learning objectives and telling the audience what you are going to tell them. This is the time to ‘hook’ your audience in with a compelling story/conflict or interesting patient case scenario. In the middle, you tell them what you said you would tell them. In the end of the presentation, summarize the key take away points, resolve the story/conflict and/or provide a call to action for the audience. By structuring your presentation like a

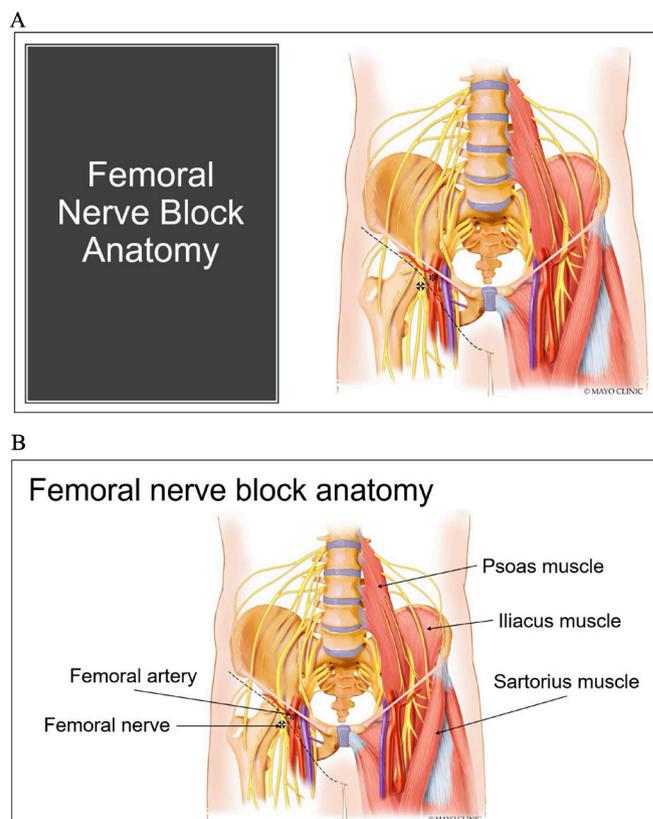


Figure 2 Example of effective use of visuals. (B) is more effective than (A) as the image is accompanied by words.

story, you draw your audience into a conflict that they will want to resolve.⁵

Tip#3: Use visuals wisely

Mayer’s Multimodal Learning Theory suggests^{6,7} that (1) our brains have two separate information processing channels (auditory and visual), (2) there is limited channel capacity and (3) that meaningful learning is achieved through active cognitive processing. Thus, visuals are essential to effective presentations, however, only choose visuals that enhance your message. Research shows that presenters who used more image-based slides received higher evaluations.⁸ These images need to be associated with words to facilitate learning. For example, a lecture that only has pictures but no words, while enjoyable during the presentation is hard for learners to recall later. On the other hand, too many words decrease the efficacy of the image (figure 2). Make sure that images of individuals are representative and not stereotypic. Short videos can be effective to demonstrate a new technique, especially those with overlays of words at key points. According to Mayer’s Coherence principle, people learn better when extraneous words, pictures and sounds are excluded.⁶ Thus, avoid using animation and sound effects in presentations.

Tip #4: Keep slides simple

Keeping slides simple is the most frequent recommendation for medical presentations.⁹ Table 1 summarizes formatting tips to improve clarity of slides, including the minimum font size that should be used and recommended sans serif fonts. Larger font sizes are perceived as more important leading to enhanced memory in audience members.¹⁰ The ‘rule of 6’ (a maximum

Table 1 Tips for improving slide design

Font	Use sans serif fonts (Arial, Helvetica, Calibri) ^{11 42}
Font size	Headings at least 36pt, Main text 28 pt (in classrooms <200 people) ^{11 43}
Text	Rule of 6x6 (six lines of text and six words per line). Avoid ALL CAPS (harder to read and little contrast). Italics can also be harder to read.
Organization	Use bulletpoints of active language with parallel construction
CARP principles	Contrast—use dark text on light background or vice versa ¹² ; can use larger font or different color to highlight element on slide Alignment—creates visual consistency in design and organization of content Repetition—repeating visual elements (font type, background, shapes, colors, texture) helps with good organization and unity Proximity—group things on the slide that belong together
Color	Maximum of four colors Avoid using red and green text on the same slide because those with colour blindness will have difficulty distinguishing.
Images	Include images that augment your message
Sounds/animations	Avoid sounds/animations as they are distracting

CARP, contrast, alignment, repetition, proximity.

of six lines of text per slide and six words per line) should be employed for each slide to improve visual clarity.¹¹ Avoid using your slides as a teleprompter; YOU are the presentation, and the slides are just visual aids. While color can be effective to highlight key text on a slide, more than four text colors diminishes this effect and becomes distracting.¹¹ Many presentation programs now include design templates with fancy fonts and layouts, and even provide slide design ideas. While some are visually appealing, consider the slide design tips in [table 1](#) and only choose design layouts and suggestions that amplify your message and are not distracting or violate Mayer's principles. Review your presentation for Americans with Disabilities Act compliance to ensure accessibility for diverse participants (see https://www.framingham.edu/Assets/uploads/about-fsu/accessibility/_documents/7-steps-accessible-ppt.pdf).

Another important concept in slide development is to show restraint in the number and content of slides. The rule of thumb of 1 min per slide may not apply depending on the content of the slides.^{12 13} By using fewer slides, you can develop the content at a pace the listener can absorb and take full advantage of discussing that slide.

Tip #5: Incorporate pause techniques to actively engage your audience

Although controversial, the average adult's attention span is thought to be only 10–15 min.^{14–16} While some continuing medical education conferences have used this knowledge to modify the format of their sessions to a series of short presentations by multiple speakers grouped together, this format change may not actually achieve the goal of retaining audience attention. Uninterrupted talk for greater than 15 min, even if done by a series of speakers, is still not an effective way to learn. Breaks, also known as 'pauses,' provide opportunities for learners to consolidate, process, and reflect on what they have learned, which are critical steps in retention of the material. The learners can refocus their attention and prepare themselves for what is coming next.

Incorporate 'pauses' into your presentation by utilizing active learning activities every 10–15 min of the presentation.¹⁷ Pauses can vary from 30 s to 3 min or longer and research has shown that pauses improve retention and audience satisfaction.^{18 19} We will describe three types of pauses useful for lectures that we characterize as (1) problem solving, (2) sharing and (3) consolidating.

1. Problem solving pauses often involve quizzing learners in a low threat way. Lecturers can use audience response systems to poll the audience, thereby promoting engagement in the lecture.^{20–24} Polling gives the lecturer feedback on potential

gaps of knowledge early on in a lecture and can spur discussion. The key is to choose questions for audience response without an obvious correct answer. There are high-tech audience response systems, such as Poll Everywhere, Slido, Turning Point, and even polling capabilities in Zoom. An advantage of electronic polling is that it is anonymous and helps an audience develop trust in the lecturer, thus opening the door for even more active engagement later in the presentation.²⁰ A downside of high-tech audience response systems is the risk of the technology not working in a live presentation. A low-tech way of quickly polling an audience is to have them do a quick 'show of hands,' where participants raise their hands in response to your question. Alternatively, you can provide each attendee with colored cards that correspond to different answer choices.

Consider posing questions where multiple answers could be viable options, thus requiring and encouraging discussion. After breaking attendees into small groups, participants can discuss the question and when returning to the larger group indicate their choice of answer. Engage your audience in a debate by asking an audience member showing answer A why they did not choose B, and another member answer why they chose A, etc. Everyone is engaged and paying attention.

2. Sharing pauses give the audience time to think and chat about the lecture topic. In a 'Think-Pair-Share,' the lecturer asks the audience to think about a particular question or issue, then asks them to discuss it with the person sitting next to them. The lecturer can then invite several audience members to share their discussion with the larger group. 'Think-Pair-Share' is an effective method in small classroom lectures, conference presentations and even keynote presentations.^{25–27} 'Sharing' can be challenging in a very large audience, where you may not have adequate time to share perspectives effectively. In those situations, the presenter can provide a slide that summarizes what the lecturer thought they might have discussed in the 'Share' part. While 'Think-Pair-Share' can be highly energizing for the audience, the recommendation is to use it only once in an hour.²⁸
3. A writing pause helps your audience consolidate learning through writing and is most useful in a full length lecture or at the end of a continuing medical education program. At end of the presentation, you can have the participants write an action plan based on what was discussed in the lecture. This can be shared in small or large groups. The learner can also complete the following sentences 'Today I learned...', 'I was surprised to learn...', and 'My take-away lesson from today was...' The goal of this activity is to promote

Table 2 Sample presentation timeline for a 1-hour lecture

Time	Activity	Corresponding slides
3 min	Introduction/disclosures	Slide 1–2
1 min	Objectives or 'Roadmap'	Slide 3
10 min	Learning objective one material	Slides 4–12
4 min	First pause activity: polling	Slide 13
10 min	Learning objective two material	Slides 14–23
8 min	second pause activity: Think-Pair-Share	Slides 24
10 min	Learning objective three material	Slides 25–34
4 min	Conclusions and summary; maybe time to ask audience to jot down their next steps	Slide 35
10 min	Question & answer	

transformative learning,²⁹ learning that changes our perspective through reflection and allows for integration into one's clinical practice, thus enabling behavior change and professional development.^{30–32}

LECTURE DELIVERY

Tip #6: Be proactive about time management

Strategic time management is important in both lecture development and delivery. Once the learning objectives are developed, create a rough timeline to determine the time to devote for each learning objective, as well as time for pauses and audience engagement. [Table 2](#) is a sample timeline for a 1-hour lecture. This preparation can help inform how much content you choose to include and how many slides are needed for each section of the presentation. Write down what you are going to say for each slide. While you do not want to treat this as a script that you read verbatim, it can be helpful in determining how long the presentation will take.

Audience members do not like presentations that exceed their allotted time, nor do they like presenters to rush through or skip slides. Thus, when developing your presentation, shift content off the slide into your notes. The audience will never know if you needed to omit content due to time, which is a better strategy than skipping slides during a presentation. Since it can be hard to estimate the time needed for pauses, consider practicing at your home institution. Proactively create a resource list that can be available to participants and that can include content you may have had to skip in your presentation.

Strategize how you will keep time during the presentation. Some venues have a timer display, otherwise you may need to use a watch or a clock app on your phone with a display large enough to see while on the podium. Alternatively, recruit someone in the audience to monitor time for you and alert you at specific time intervals, ideally more than just a 5 min warning.

Tip #7: practice deliberately

Although intuitive, practice is essential to delivering the presentation the way you want. Practice out loud exactly what you will say, practice several times. You want to be familiar enough with your slides that you know generally what each slide is about and what is coming next so you can transition smoothly to the next slide. Ideally, practice should include rehearsing in front of a live audience, preferably colleagues who can provide feedback on the content, delivery and clarity of message. Presenters should critically think about their experience presenting in the past and identify what they need to optimally prepare themselves. Perhaps this means using a relaxation exercise prior to

presenting or practicing the presentation at your home institution. Prior to your presentation, scope out the venue for your presentation and check that your slides and videos work at the venue. Bring a backup of video in case a link is not working and consider having backup images as alternatives. Note if there is a lectern, stage, and timer. Plan how you will use the space in your presentation, especially where you will stand and if you have the option to move around.

Tip #8: use body and voice to augment your message

Effective use of body language and voice is crucial in connecting and engaging with the audience, as well as conveying your enthusiasm for the topic. Nonverbal communication and confidence of the presenter are linked to quality of presentation and teaching effectiveness.³³ Stand with a confident posture with your back straight, chest out and your arms open. Make eye contact by picking out individuals at various locations in the audience and speaking directly to them. Embrace that YOU are the presentation and avoid reading from slides or using them as crutch. Make purposeful hand gestures that augment your message. Avoid crossed arms, hands in your pocket or behind your back, and avoid too much gesturing as it can be distracting. Use your whole hand to gesture to avoid potentially offending someone with single finger movements such as pointing. Consider moving around rather than staying behind the lectern but be careful not to pace or fidget. Use a microphone when presenting and vary your tone and speed of your voice to maintain interest. We all have verbal fillers such as 'umm...' and 'uh...' Practice using silence instead of these fillers. Briefly pause to emphasize key points in the presentation. Practicing in front of others or videotaping yourself presenting can be helpful in identifying what body language is distracting rather than enhancing your message.

Tip #9: incorporate feedback and reflection in your process

The practice of critical reflection is integral to professional development.^{29 34} Prior to your presentation, ask a colleague to attend and provide with you feedback afterwards. Online supplemental appendix 1 includes an observation form that your colleague can use to provide feedback. It also includes a section to help you develop an action plan for how to improve your next presentation of what you want to keep doing, what you want to do less of and what you want to start doing. Take the time right after presenting (or as soon as possible) to do this. These notes become invaluable for the next time.

PROMOTING ATTENTION IN THE VIRTUAL WORLD

The COVID-19 pandemic has resulted in a dramatic increase in virtual presentations and conferences with many permanently shifting to this format or hybrid formats. This format presents unique challenges and considerations for the presenter. When presenting virtually, choose a quiet, well-lit room with stable internet connection, paying close attention to what is visible in the background and limiting any potential distractors and interruptions, such as ceiling fans and unexpected visitors. Close all other open applications and windows on your computer and silence notifications. Make eye contact with the camera, positioning it at eye level or slightly downward.³⁵ Use a dedicated microphone to optimize the audio quality rather than the built-in microphone on the computer and do a technical check prior to the presentation. Limit your hand gestures in a videoconference as it can be distracting. If

you are opting to use a virtual background, choose one that is simple, plain and has high contrast to you and what you are wearing and test it out prior to your presentation.^{36–38} While nature virtual backgrounds are more effective at promoting creativity than urban or gray backgrounds,³⁹ consider the goals of your presentation and whether the virtual background adds to your message.

Importantly, in virtual presentations consider how the audience will be viewing the presentation. If tablets or smartphones will be used, slide content needs to be simplified and font size needs to be increased.⁴⁰ Test out your presentation on smaller devices and make sure your content is readable.

With a virtual format, the speaker often lacks the visual and auditory feedback from the audience, and it can make it very challenging for the presenter to connect with and engage the audience. Consider having attendees use the 'reactions' (non-verbal icons) in Zoom to show agreement and to indicate if they need you to slow down or speed up, or take a break.⁴¹ Another option is to use your slides as your virtual background so that the audience can see your face at the same time as viewing your slides.

When planning a virtual presentation, active audience engagement strategies can still be used with adaptations to the virtual format. Most virtual presentation platforms have polling capabilities; practice polling ahead of time to familiarize yourself with the software. Orient the audience for how the question and answer process will be handled, particularly if the chat function will be used vs a separate question and answer function. Monitoring chat while presenting is challenging; recruit a partner to monitor the chat or stop and explicitly tell the audience that you are reading the chat. Breakout rooms are an excellent way to promote engagement. Given that it is hard for the presenter to monitor what each group is doing, consider using a Google doc that each small group can complete. Reading the Google doc, you can see if groups are not producing and may need more support, as well as quickly see what the groups are thinking and highlight or summarize for the large group when they return from breakouts. This document becomes a permanent resource the audience can look at later. Jamboard (jamboard.google.com) is another Google product that allows audience members to provide responses as anonymous post-its and can be used in brainstorming and in discussion of sensitive topics in which anonymity is desired. Consider recording your presentation to review or share with a colleague to seek feedback.

CONCLUSION

The medical lecture, whether in-person or in virtual format, can be revived through careful planning and practice. These nine tips can guide you in developing and delivering presentations. Starting with specific objectives helps you clearly express your message while conveying and generating enthusiasm for the topic. In the development process, tailor the presentation to the target audience and identify ways to actively and authentically engage the audience. Planning and practicing are crucial for effective delivery. Committing to actively soliciting feedback and incorporating critical reflection into the process will help you improve for your next presentation.

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Contributors All authors were involved in study design, data interpretation, drafting and final approval of the work. All authors agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests MH was a faculty development consultant for the American Society of Regional Anesthesia Pain Medicine ending in April 2020.

Patient consent for publication Not applicable.

Ethics approval This study does not involve human participants.

Provenance and peer review Not commissioned; externally peer reviewed.

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