Lesson planning for anesthesiologists: A simplified approach

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Abstract
Anesthesiologists are responsible for teaching in-person and online, often with little formalized training in medical education and lesson planning. This review presents a “backwards approach” to lesson planning with the aim of guiding and simplifying the process for anesthesiologist teachers. The first step in lesson planning is the creation of learning objectives which should be specific, measurable, and reasonable in number. The instructor then needs to consider which assessment methods might be used to measure the extent to which the learning objectives have been achieved by the learner group. A needs assessment of the learner group will help to refine the learning objectives and assessments methods and will provide context for the learning activities. The timeline and types of interactive learning activities chosen to present the material should be clearly outlined (often using a lesson planning template) so that a road map is created for the teaching session. Finally, the teacher’s reflections on the teaching session can incorporate the results of assessments and feedback from learners to guide future iterations. This backwards lesson planning method can be successfully implemented for both in-person and online learning and provides an organized approach for novice and experienced anesthesiologist teachers alike.

Key words: Backwards Lesson Planning; Medical Education; Learning Objectives; Needs Assessment; Assessment

INTRODUCTION
Anesthesiologists are called upon to teach both didactically (in a “classroom” setting) and clinically (at the bedside or in the operating room), often without formal teacher training in either setting. While most anesthesiologists plan and execute their teaching using techniques modeled for them during their own pre-medical and medical education experiences, few anesthesiologists have received formalized training in lesson planning. However, some teachers in anesthesiology have completed advanced training in medical education. Examples of such training opportunities include medical education graduate level programs, specific teaching courses such as the INSPIRE course and local variations of the “Teaching Excellence Program”. Self-guided online teaching resources are also accessible to those with access to the internet. Some anesthesiologists may have prior career experience in teaching and lesson planning (at the elementary, secondary school, or university level).

Since teachers in anesthesiology may not have received any formalized training in educational design and delivery, common issues encountered in teaching can include a lack of focused learning objectives, inadequate measurement of student learning, and logistical issues related to the choice and delivery of lesson content. Approaches to lesson planning have been presented in the nursing and medical education literature. Articles related to lesson planning specifically in anesthesiology have also been published. While these resources can be both informative and grounded in educational theory, for example Gagne’s educational theory, they can sometimes be overly prescriptive or complex for novice teachers.

Educators must also take into account the differences in skill and knowledge level of medical learners, as well as the different learning styles that might appeal to these adult learners. When planning a lesson, medical educators must be deliberate and selective in choosing both the content and delivery methods of their lessons in order to maximize the chances of their students achieving the learning objectives.

This review article aims to present a simple guide to planning a lesson using a modified “backwards
approach”, which was originally outlined by Wiggins and McTighe. This approach emphasizes the crafting of measurable learning objectives and the creation of a clear, time-managed plan of interactive learning activities that can be deployed both in-person and online.

### Backwards approach to lesson planning

This article offers a “backwards approach” to lesson planning, which is visually depicted in Figure 1. The first step of the backwards approach is the creation of learning objectives which describe what the learner should be able to know or accomplish by the end of the lesson. In the second step of lesson planning, the teacher determines which assessment methods will be used to decide if the learners have achieved the learning objectives. This step is important as otherwise it will be unclear to what extent the students have met the learning objectives. Step three is a needs assessment of the learner group, where the specifics of the learners are considered. This will include an evaluation of their baseline level of knowledge and experience related to the subject matter. The results of the needs assessment will help shape the lesson and may require some modification of the first two steps. Educators must keep in mind that the lesson planning process is iterative, so it would not be unusual to have to revise the learning objectives and the assessment methods based on learner needs determined in step three. The final step is the creation of the actual lesson, using a variety of teaching methods and activities. For illustrative purposes, this article will use the example of teaching anesthesiology residents about handover of patients to post-anesthesia care unit (PACU) staff using a standardized checklist (see Appendix 1 for checklist). This example will be expanded upon in each section of the article, in order to provide a real-world example of the backwards lesson planning method, as well as a sample lesson plan using a template.

![Figure 1. A modified ‘backwards’ approach to lesson planning](www.wfsahq.org/resources/update-in-anaesthesia)

The reason that this lesson planning approach is described as “backwards” is that it begins with the “end goal” in mind: the achievement of the learning objectives by the students. A more traditional approach to lesson planning might be one where the teacher creates a Powerpoint presentation or slide deck on a topic, and only then circles back to pick and choose learning objectives from the presentation content. The backwards approach is advantageous as it forces the instructor to be deliberate about creating learning objectives from the start, and to incorporate a plan to assess whether students have achieved the desired objectives.

Step 1 is the creation of specific, student-centred learning objectives, followed by Step 2 where the teacher chooses how to assess whether the desired learning has occurred. Step 3 is a needs assessment of the learner group, and this may help to refine the learning objectives and assessment methods. In step 4, the teacher chooses a variety of interactive learning activities to present the material in an engaging and time-conscious fashion.

After the teaching session is done and the lesson plan has been implemented, it is important to reflect on the effectiveness of the approach. The instructor should determine whether the students have achieved the intended learning objectives and if the material presented in way that promoted active, participatory learning. Feedback from students and the results of any student assessments of learning will help to guide this reflective process, and this information can iteratively improve future teaching sessions.

### Step 1: Learning objectives

A learning objective is a concise statement that clarifies what the learner should be able to know or do as a result of a learning experience. Learning objectives should be student-centred and focus on what the student will achieve, rather than teacher-centred, concentrating on the information the teacher wishes to impart. While the nomenclature and theory behind the creation of learning objectives is a subject that warrants its own reviews, this guide to lesson planning is meant to be a very practical one for anesthesiologist teachers looking to improve their teaching sessions in the real world. Teachers can start by asking themselves: “By the end of my teaching session, what do I expect the student to know, and in how much detail?” Guidance from online resources can be helpful for medical educators crafting learning objectives.

Medical educators have traditionally used Bloom’s Taxonomy to classify objectives at various levels of learning, and to help them create objectives using descriptive verbs. Bloom’s Taxonomy is a hierarchical classification of learning, from lowest complexity (remember) to highest complexity (create). There are 6 levels or categories of learning/skill within Bloom’s taxonomy. The taxonomy is often presented a pyramid, with associated key verbs for each level that can be incorporated into learning objectives.

Suggestions for verbs to incorporate into learning objectives at the various different levels of Bloom’s taxonomy are presented on the right hand side of the diagram.

Using the example of teaching handover in the PACU, imagine that you are given an hour to speak to the residents over Zoom (online teaching/meeting platform) at their academic half day. The residency
program has asked that you teach about the Anesthesia Patient Safety Foundation (APSF) succinct PACU checklist/approach to handing over patients to the nursing staff after surgery (See Appendix 1 or visit https://www.apsf.org/article/improving-post-anesthesia-care-unit-pacu-handoff-by-implementing-a-succinct-checklist/).

In this scenario, you may be given several learning objectives (often based on the residency program training curriculum) or you may need to develop a reasonable number of learning objectives. Let’s say that you decided to develop 3 learning objectives for your 1 hour session. Depending on your learner group, it is a good idea to create learning objectives at different levels of Bloom's taxonomy, with some objectives at the lower levels (remember, understand, apply) and some at the higher levels, if appropriate (analyze, evaluate, create).

Using the suggested verbs from Figure 2, you create the following 3 specific and measurable learning objectives for the residents:

By the end of the session, students will be able to:

1. List the three elements of the APSF’s succinct PACU handover checklist (REMEMBER level)
2. Demonstrate a PACU handover during a role-play with a partner, using the succinct PACU handover checklist (APPLY level)
3. Critique a sample video of a PACU handover, providing 2 examples of desirable handover behaviours and 2 examples of undesirable handover behaviours (EVALUATE level)

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Learning objectives at 3 different levels of Bloom’s taxonomy have been created using appropriate verbs

Step 2: Determination of assessment method
Assessments of learning can take many forms, and assessments can be formative or summative. Formative assessments are those intended to provide feedback to the learner at a certain point in time, usually without high stakes consequences. Formative assessments are frequently used to frame daily feedback in residency training. Summative assessments are usually the final stages of assessment, and relate the learner’s performance to a certain standard or benchmark. Summative assessments are those which are used to make decisions about pass/fail status or progression to next level of training. Most of the assessments taking place in the context of lesson planning in anesthesiology education are therefore formative. Examples of various methods of assessment are presented in Figure 4.

Despite providing clear learning objectives and engaging in stimulating participatory teaching activities, anesthesiologist teachers sometimes fail to assess the learners for evidence that they have achieved the intended learning objectives. While it is important to consider the consequence and scope of the chosen learning objectives, teachers must incorporate some form of assessment of the learning objectives, as it will foster learner participation and provide the instructor with information about the success of the content delivery. This feedback will shape future iterations of the teaching sessions. If none of the students can achieve the intended learning objectives, the instructor must consider whether there is a mismatch between the objectives, the knowledge level of the learner group, the educational delivery methods, or the assessment methods themselves.

Coming back to our example of the PACU handover, there are several possible assessment methods that could be considered for the resident group. These might include a written multiple-choice quiz (in-person or online), a simulation session where the residents practice the PACU handover and receive formative feedback on their performance, or a videotaped “live” handover in the actual PACU, with a checklist evaluation that documents any crucial missed steps or information. One can see that while some assessment methods might involve a minimal amount of time or resources, others might represent expensive, time-consuming or resource-heavy activities.

Step 3: Conducting the needs assessment
A needs assessment is a set of steps or processes that is used to determine the gap or deficit between the current skill and knowledge level of an intended learner group and the desired outcome of the teaching. Without the results of a needs assessment, a teacher will not be aware if the lesson is covering information that the learners already know well, or if the information that will be presented is well above the current knowledge level of the learners and thus the learning objectives may prove to be unrealistic for a particular group. A needs assessment may be performed by having the learners provide information to you directly about their learning needs or by completing some form of pre-test prior to the lesson. Alternatively, you can acquire information from a course coordinator, previous teachers, or by looking at the broader curriculum to see what the learners have covered in the past.

Depending on the situation, the learner group may be quite homogenous and the gap between current knowledge status and desired outcome may be obvious and realistically surmountable for both the students and the teacher. However, if the learner group is quite varied (novices and experts in the same group) or if the desired learning outcomes of the students compared to those of the teacher are quite different, this must be addressed before choosing appropriate teaching methods and activities. The results of a needs assessment may lead the teacher to review and refine the learning objectives to meet the needs of the learner group rather than to arbitrarily address learning objectives selected from a standardized curriculum. There will usually exist some level of discrepancy between the learning objectives as determined by the instructor, and the learning needs and desires of the learner group.

For our PACU handover example, the instructor will want to know the following information about the resident learners: What level of clinical experience do the learners have? Have they previously had lectures of this subject, and what is their level of baseline knowledge on handovers in general? How will the teaching session take place (in-person or online) and how familiar is the group with the proposed technology? Are there any barriers to the learning in the session (including resources, technology, divided attention, fatigue, biases)? What do the learners themselves wish to know about PACU handovers, especially if this differs from the prescribed learning outcomes as chosen by the instructor or as outlined in the residency curriculum? A quiz, survey or brief group discussion can provide much of this information to the instructor.

Step 4: Planning the learning activities
The choice of learning activities and instructional delivery methods in medical education is a vast topic. Much of our medical education delivery can be opportunistic and loosely-planned, especially in the clinical setting. When the opportunity to plan ahead and be selective...
about learning activities presents itself, it makes good sense to ensure that the chosen activities are engaging, participatory and varied throughout a teaching session21. Medical educators have generally moved away from the podium-style lecture where the presenter reads a succession of slides to the audience. Instead, teachers are using different media (art, photos, videos) to stimulate group discussion. Small group debates and partner activities where learners interact can often be included during teaching sessions. Case-based examples and interdisciplinary learning opportunities are options that provide variety compared to traditional “lecture-style” content delivery. With the COVID-19 pandemic, there has been a shift to online educational activities for many medical learners. While this technology-facilitated learning can be limiting in some ways, it has also opened avenues to teaching and learning collaborations that span time zones and geography in a way that has not been previously embraced. There are also major implications for the delivery of medical education to groups in areas with previously limited access, although this may still be technology- and resource-dependent.

Many interactive teaching activities can still occur online, including small group activities using breakout room technology, where the larger group is broken into a number of smaller groups for discussion before all students are “returned” to the lecture. The use of whiteboards and polling allows for interaction between the online presenter and the participants. The option for participants to type in questions to a chat or to interact with a question/answer function within presentation software also ensures engagement of the participants without undue disruption to the lesson.

Both in-person and online teaching sessions must be planned out using a realistic timeline which ensures that all objectives are addressed. Interactive learning activities may take longer than purely didactic teaching. Time may need to be built into lesson plans for breaks and anticipated technological interruptions or difficulties. Limitation in available time for teaching sessions due to clinical commitments further reinforces the importance of choosing a reasonable number and scope of learning objectives as the first step of lesson planning. Creating too many learning objectives or using learning objectives at too high of a Bloom’s level can lead to frustration on the part of the teacher and the learner.

Lesson plan templates are useful tools for mapping out the timing and scope of learning activities. Different examples of lesson plans can be found online22 and these can be customized to suit the needs of the teacher/learning group. An example of a completed lesson plan template for the sample PACU handover lecture is included (Appendix 2). This example includes a variety of interactive learning activities including viewing and discussion of a PACU handover video, and a role-playing exercise among learners. It incorporates and outlines all 4 steps of the backwards lesson planning process.

Sharing lessons plans with students before or after a lecture may increase their motivation and engagement with the lesson23. Having a written lesson plan can also provide direction for a colleague should an instructor become unavailable on short notice. The sample lesson plan presented in Appendix 2 incorporates a clear activity timeline and includes links to various resources used in the lesson. The lesson plan can be used and modified by a variety of anesthesiologist teachers, based on the needs of current and future learner groups.

**Reflection on teaching**

Feedback on the lesson plan can be obtained in multiple ways. One method is the use of planned formative student assessments as a means of determining the “success” of the teaching session. These assessments can reveal the extent to which students achieve the learning objectives that were chosen and can identify major learning gaps. Other practical aspects of the lesson should be considered as well. For example, if the instructor ran out of time and had to skip over important material, the lesson plan for future iterations should be altered. If there were technologic or connectivity difficulties, these can be addressed before future lessons. If the teacher perceived that certain learning activities failed to engage student participation, other methods of lesson content delivery might be chosen in the future.

Many online meeting and teaching platforms have a recording function available. The ability to record the teaching session (with the learners’ consent) provides the opportunity for peer teacher review. This can provide useful insights for the instructor. Since many lessons will be delivered again to future groups of students/residents, lesson planning is an iterative process that can be modified and improved each time the content is delivered. Furthermore, reflection on the instructor’s teaching and the feedback from learners can help with the instructor’s professional development as a medical educator.

**CONCLUSION**

The backwards approach to lesson planning ensures that the instructor begins “with the end in mind.” Learning objectives and assessment methods for these objectives are created prior to determining the type and scope of learning activities that will best suit the needs of the learners. The use of a lesson plan template can help the anesthesiologist teacher create a clear road map and ensure that all steps of the backwards lesson planning method have been addressed. Reflection on the quality of the teaching, and feedback from learners and from learner assessments can refine future lessons. The simplified approach to lesson planning presented in this review will promote skills and confidence for anesthesiologists teaching medical learners in-person and online.

**REFERENCES**


**Appendix 1**

**Figure 1. PACU Handoff Checklist**

<table>
<thead>
<tr>
<th>Patient</th>
<th>Procedure</th>
<th>Medications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Identification (Nameband check)</td>
<td>Positioning of Patient (if other than supine)</td>
<td>Analgesia Plan - During Case, Postop Orders</td>
</tr>
<tr>
<td>Time In</td>
<td>Intubation conditions (grade of view, airway, quality of bag mask ventilation, bite block?)</td>
<td>Antiemetics Administered</td>
</tr>
<tr>
<td>Allergies</td>
<td>Lines/catheters (IVs, a-lines, CVSs, foley chest tubes, surgical drains, VP shunt)</td>
<td>Medications due during PACU (antibiotics, etc.)</td>
</tr>
<tr>
<td>Surgical Procedure and Reason for Surgery</td>
<td>Fluid Management</td>
<td>Other Intra-Op Medications (steroids, antihypertensives)</td>
</tr>
<tr>
<td>Type of Anesthesia (GA, TIVA, regional)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgical or anesthetic complications</td>
<td>Fluids=</td>
<td></td>
</tr>
<tr>
<td>PMH and ASA Scoring</td>
<td>EBL=</td>
<td></td>
</tr>
<tr>
<td>Preoperative Cognitive Function</td>
<td>UO=</td>
<td></td>
</tr>
<tr>
<td>Preoperative Activity Level (METs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limb Restriction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preop Vitals</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Do you have any questions or concerns?"

## Appendix 2: Sample lesson plan for PACU Handover teaching session

### Course
Academic Half Day

### Date
August 2021

### Lesson title
PACU Handover

### Summary
This one hour teaching session is intended to present an approach to postoperative handover in the PACU for anesthesiology residents, including the importance of structured handover, and the use of a cognitive aid/tool for a complete handover.

### Learning objectives
1. Students receive an email copy of the APSF Succinct PACU Handover cognitive aid to print out before the lesson
2. Complete the needs assessment survey (see above)
3. Read the following article (10 mins)

### Formative assessment
**BEFORE THE LESSON**
- Students receive an email copy of the APSF Succinct PACU Handover cognitive aid to print out before the lesson
- Complete the needs assessment survey
- Read the following article

**THE LESSON**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Learner activities</th>
<th>Instructor activities</th>
</tr>
</thead>
</table>
| 5 mins | Introduction | Review learning objectives | Introduce lesson timeline and learners handover preparation
| 5 mins | APSF PACU handover tool review | Review the components of the tool (Patient, Procedure, Medications) and the sub components | Present learning objectives
| 5 mins | Video | Active listening/watching | Present videos
| 5 mins | Role play PACU handover | Partner activity/active participation | Ask patient to use the PACU handover tool to guide role play conversation
| 5 mins | Quiz | Fill in the quiz | Use your most recent memorable case in the OR

### Needs assessment
Learners will complete a questionnaire about knowledge of handover principles, experience with handover prior to the session, and demographic data

### 3: AFTER THE LESSON
**Learner Assessment**
Learner will record a PACU handover and submit to instructor for review

**Lesson Evaluation**
Residents will complete the academic half day evaluation – evaluate both the lesson and the presenter

Follow up with PACU RNs at teaching site to see if any noticeable changes/improvements to handover

Follow up at academic day 1, 4 weeks for brief discussion of residents' handover experiences since the lecture