

Editorial

The Days Are Just Packed: Learning Surgery on the Go...

Skylar Rodgers¹, Curt Tribble^{2,*}

¹Department of Surgery, University of Virginia, Charlottesville, VA 22908, USA

²Division of Cardiothoracic Surgery, University of Virginia School of Medicine, Charlottesville, VA 22908, USA

*Correspondence: ctribble@virginia.edu (Curt Tribble)

Submitted: 15 April 2024 Revised: 19 April 2024 Accepted: 7 May 2024 Published: 23 June 2024

Introduction

There are several, somewhat competing, priorities for students during their Surgery Clerkships, while they are rotating on surgical specialty services, such as Thoracic and Cardiovascular Surgery. First of all, it is worth remembering that a Surgery Clerkship is a course in Surgery for primary care doctors. It is not a course in Surgery for future surgeons, though, of course, all clerkships do provide medical students an opportunity to begin sorting out their future career options. And, it is worth remembering that every medical student will acquire the knowledge on all clerkships that will help them care for their future patients, regardless of the student's future career trajectory.

What Got You Here Won't Get You There

Everyone involved in medical education is aware that the learning strategies used by medical students on clinical rotations are quite different from those used in many of their prior educational experiences. For instance, there is an old saying that a Surgery rotation in the third year of medical school is more like a summer camp experience than it is like a college chemistry or biology class. With that background in mind, we will offer some specific suggestions for medical students to help them get the most out of a Surgery clerkship in medical school. While this advice will pertain most specifically to the clerkship experience, it can also be applied, to some degree, to other experiences in the third and fourth year of medical school, as well as to residency training and, even, learning throughout one's career. Let's get started.....

Focusing Your Study Time

One way of thinking about how to focus one's learning on all clerkships in medical school is to have some idea of what will be on the shelf exams that are usually given at the completion of each clerkship. The Surgery shelf exam has approximately the following emphasis or 'matrix' built into the distribution of the questions:

- General Surgery: ~70%

- Subspecialties (those preceded by training in General Surgery, like Thoracic Surgery or Vascular Surgery): ~20%

- Sub-subspecialties (those generally not preceded by General Surgery, like Orthopedics or Neurosurgery): ~10%

Therefore, it seems only logical to allocate your overall study time along these lines during a Surgery Clerkship.

Reading about Your Own Patients is Always a Priority

However, it is also important to be reading about the patients that you and your teams are caring for, day to day. This principle holds true for several reasons, including:

- Everything you read (or see or hear about) will stick to you like glue, if this information has relevance 'in the moment' to real patients and their clinical issues.

- Everyone with whom you interact on your clinical teams will be expecting you to prepare for and to reflect on the patients your team is caring for at any given time.

Still, you must also allocate your study time recognizing that the shelf exams given at the end of each clerkship and the United States Medical Licensing Examination (USMLE), Part II will include issues and conditions that you may not have personally encountered on your specific clinical rotations. Therefore, you must read more broadly than just about the patients that you and your teams are caring for.

You should have two approaches to focusing your reading time. First, as noted, you should focus some of your study time on your own patients' problems, both the inpatients you are following and your upcoming cases. Second, you will also need to focus on topics considered "high-yield" for the shelf exam that you will take at the end of your rotation. This approach will ensure that you are adequately prepared to do well on your shelf exam, and it will also provide you with a good breadth of knowledge, representative of the entire specialty, rather than just the subspecialty services that you may be rotating on (such as pediatric surgery, cardiac surgery, endocrine surgery, *etc.*).

When preparing for a case that you plan to participate in, you should learn about your patient's history and refresh yourself on any illnesses or previous operations that your patient may have had, especially those with which you are less familiar. When preparing for the operation itself, you

will need to review the indications for the procedure, the relevant anatomy, and the basic operative steps, so that you will understand the general flow of what will happen in the operating room. Zollinger's Atlas of Surgical Operations is a good resource for this type of preparation for most general surgery operations.

When Should You Read?

Most medical students will have developed a set of favorite study habits by the time they get to medical school. For instance, some will have found that it is optimal to study in the early morning while others will prefer to study in the evening. However, most students, during their clinical rotations, will find it necessary to study when time permits. Therefore, it is a good idea to keep something with you to read or study at all times. While it is more and more feasible to read on a cell phone, many will still prefer to have printed material with them to read when they find scraps of time to do some reading. It is optimal to create a reading schedule or a plan to which you will ultimately adhere. For instance, you can assign yourself a certain amount of reading per week and, if you cannot get your 'assignment' completed during the days and evenings on your clinical rotations, you should commit to catching up on the weekends.

Learning on the Go

Unfortunately, from the day you start into your clinical rotations, and from that time forward, you will not have very much dedicated study time when you will be able to sit in your favorite study space and spend several hours of uninterrupted time learning about a topic. You will need to adapt and learn to study during the "down time" on your rotations. These times will be when you are in the student lounge, the resident lounge, or even the operating room waiting for the next case to begin.

While you cannot learn all that you will need to learn from question banks alone, many students will find it useful to maintain access to a question bank, such as Truelearn or Uworld, on their phones and to practice questions (in 'the untimed, tutor mode') during their clinical rotations. This approach will allow you to complete a practice question, get immediate feedback, and read the explanation for that topic. This approach may be more helpful than using 'test mode' in which the correct answer, with an explanation, is presented only after completing the entire question set. Since, it will be unlikely that you will be able to complete an entire question set in one session and review all the answers during these often short intervals, it will be best to just do the questions one at a time and utilize the immediate feedback provided. If there are questions that you miss or topics you do not completely understand, you should include those topics in your 'reading list'.

At the beginning of your rotation, when you understand what your daily schedule will be, you should set a goal for a minimum amount of dedicated time each day to study and to prepare for cases outside of work. You should be reasonable with your goals (you may have as little as 30 minutes each day, depending on your schedule) and hold yourself accountable to your plan. Of course, there will be days when you can study more, but always try to hold yourself to at least the minimum amount of reading that you have committed to accomplish. You may find keeping a log to be useful in implementing this plan and doing so can be inspirational.

Another tool to facilitate "learning on the go" can be listening to podcasts during your daily commute or while exercising. For example, 'Behind the Knife' is a podcast series that is popular among surgical trainees and that covers a broad range of topics, with new episodes released weekly [1].

As a third-year medical student, you should also be learning new skills, such as the insertion of intravenous catheters or of the placement of Foley catheters. Do not underestimate the educational value of all of the members of the clinical team to which you are assigned, such as nurses, scrub techs, pharmacists, *etc.* These people can be excellent resources with loads of practical experience and, they are generally willing to teach medical students. You should confidently introduce yourself to these folks, describe your role on the team, and respectfully ask questions when time permits.

As noted earlier, students on all rotations should learn about the patients that they are helping to care for day to day. While this type of learning is very different from many of a medical student's prior learning environments, it is actually quite efficient, because it is associated with actual patients, which has the virtue of feeling pertinent, rather than isolated, arcane knowledge that is more easily forgotten than that which is associated with your day-to-day experiences.

Keeping a small notebook in your pocket in which you can jot down various 'pearls' you have heard or questions that you want to look up can be very valuable. The Field Notes series, which was developed by a well-known designer named Aaron Draplin (<https://fieldnotesbrand.com/from-seed>), can be a practical choice for keeping notes of this sort (Disclaimer: We have no relationship with Mr. Draplin, other than being ardent admirers). However, to paraphrase an old saying about cameras: The best notebook is the one that you have with you all the time! Some advantages of using notebooks of this sort are that writing 'lights up' three parts of your brain, according to functional magnetic resonance imaging (MRI) studies, and, furthermore, you can draw pictures or diagrams in your notebooks to further enhance your learning. Reviewing or adding to your notes at the end of each day can also further solidify your learning and should be done every day, if at all possible.

Another good learning strategy is to find a textbook designed for third year medical students, such as *Essentials of General Surgery and Surgical Specialties* [2] edited by Dr. Peter Lawrence, and to take it to a copy center and have them cut off the binding and drill holes in the pages so that you can put the whole book in a three ringed binder. You can then easily carry a few of the pages around in your pocket to read during the inevitable ‘down times’ that occur on a clinical service almost every day, such as when you find yourself waiting while patients are ‘lined up’ and intubated in the operating room or while you find yourself in between patients when participating in a clinic.

Conferences are Valuable

Students rotating on a Surgery Clerkship should, of course, do their best to attend all of the clerkship lectures, even if that means getting to an operation or clinic a bit late. These lectures have been carefully planned out by the directors of the clerkships, and you should use that fact as a guide to allocating your time on any given day. It is useful to take notes during these lectures for several reasons, including:

- You will likely pay more attention during the lecture.
- You can (and should) review your notes later, which can serve to ‘develop’ them, which is somewhat akin to the now old-fashioned method of developing a photograph taken with a film camera.

Many Surgery programs will have an ‘education day’, which is frequently on Wednesday mornings. These days often start at 7 AM, after morning rounds, with a Morbidity and Mortality Conference (M&M), which may be followed by The Department of Surgery Grand Rounds in many institutions. These learning opportunities are very valuable, and the issues and concepts are usually broadly aligned with the priorities of the Surgery Clerkship. The other surgical services may have their own M&M conferences at some point in a given week, and many, if not most, of the residents and faculty of those services will try to attend their own department’s Grand Rounds, when they occur [3].

You will not necessarily understand all of the intricacies that are discussed at each conference in which you participate as a medical student. However, you should make it your goal to learn something new from each patient or topic discussed. If you don’t understand something that is being discussed, make a note to look it up later. You can also ask your residents for clarification after these conferences when time permits. Conferences that you will attend may include Grand Rounds, Morbidity and Mortality conference, tumor boards, pre-operative case conferences, and resident education conferences.

What, in General, Should a Third-Year Medical Student be Learning on Each Clerkship?

As is true for all clerkship rotations, you should be learning what every primary care doctor needs to know about that particular discipline. Examples in General Surgery include wound care, pain management, emergent care for certain conditions (such as appendicitis or trauma), cancer, breast disease, endocrine disorders, as well as many other conditions.

As is true for every clinical rotation, you should also be learning ‘the basics’ of that discipline and building a foundation of practical medical knowledge because your future patients’ illnesses will not be ‘specialty specific’. Regardless of which specialty you choose for your own subsequent training, your patients will likely have a variety of medical issues, in addition to those that you are most focused on at any given time. You should strive to have some basic knowledge about the presentation and management of these ancillary issues, understand when a patient’s presentation is urgent or emergent, and, at a minimum, you should know when to get a provider from another specialty involved in the care of your patient.

As your clerkship year progresses and you will be deciding what specialty you will choose to focus on in your subsequent training, consider how what you learn on each rotation can be used to make you a better, more well-rounded specialist in the discipline of your choice. You should also keep this concept in mind when selecting rotations outside of your chosen specialty for your fourth year of medical school. That year may well be your last or only chance to gain broad exposure to many of the medical specialties. Finally, you should always strive to be engaged in what you are doing at any given time, as you will get out of each rotation what you put into it [4].

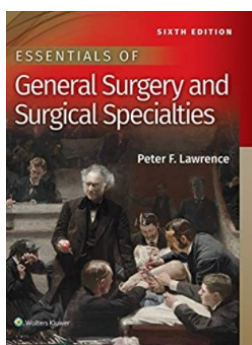
A Matrix is Useful

A very useful concept in optimizing learning in any environment is to start with some kind of matrix or overview. The simplest way to do that ‘on the fly’ is to read the introductions to the chapters in whatever textbook you have chosen to use for a given rotation. If you can do this early in a clerkship experience, you will realize that adding in bits of conversation, scraps of material someone gives you, or the things you see in the operating room or hear in the clinics will not feel like random, disconnected facts but will, rather, feel as though you are ‘filling in the blanks’ in your matrix as each day unfolds.

Reading More Broadly

Students on all clinical rotations should also have the goal of reading more broadly than just about what they are seeing day to day during those rotations. There are two overall priorities for this admonition, which are the realities that you will take exams that are broad in scope and that you most certainly want to be in the mode of trying to be the best all-round physician possible, while remembering that the next time you encounter a given clinical scenario, what you are learning as a third-year medical student may actually affect the care that you will be prepared to provide. As noted earlier, there may well be times that something you saw, heard, or learned on any given day might have a real impact on a patient you are helping care for. In fact, something you learned as a student may well save a patient's life the next time you encounter a similar situation. Most clinicians can tell you a story of this sort [5].

The best approach to this kind of more general reading is to use a textbook that was designed for medical students on any given clerkship. To be explicit, the large, encyclopedic textbooks, while good for reference and, perhaps, appropriate for residents, are not optimal for third year medical students. However, there are several textbooks of Surgery that were created explicitly for students on Surgery Clerkships. As noted earlier, many have found that the textbook edited by Dr. Peter Lawrence, *Essentials of General Surgery and Surgical Specialties* [2], now in its 6th Edition, is one of the best options. The 7th edition of this book will be available in the Fall of 2024, and it is available both in print and on Kindle. Used copies are also available on Amazon for 30 to 40 dollars. You can even rent a copy! Here's what the cover of the current edition of this book looks like:



By focusing your study time as described above, on both your patient's specific issues and on reading more broadly throughout your rotations, you will be preparing yourself appropriately to be a well-rounded physician. If, for example, you are rotating on Surgery and you are caring for a patient with a specific condition who is scheduled for an operation, you should not only prepare for that case, but

you should also spend time reviewing that patient's condition, as well as anything else in the patient's medical history with which you may be unfamiliar. The same admonition goes for reviewing other medical topics that are of particular interest to you throughout the clerkship year.

Always Have Something with You to Read

Another tenet of being an efficient and successful clinical learner on busy rotations is to always have something with you to read, whether it be printouts of articles, chapters from a book, or something you can read on your phone. This approach will allow you take advantage of the occasional lulls that occur on all clinical services.

You can make out a plan or schedule for how much you need to read each day to get through as much of the book you have chosen as you wish to read. And, if you get behind in your reading, you can catch up on the weekends (though you must also do some recharging on those days as well, of course!). It is also a good idea to ask your residents and faculty surgeons for suggestions about what you might read, especially about an unusual case or condition. They will be likely to suggest a favorite article or a chapter from a book that they have found succinct and useful.

Much like the question banks that can be accessed on your phone, so can many textbooks. Many can be accessed for free through your medical school library's website. Similarly, there are pocket sized books that can be carried in your white coat, such as *Pocket Surgery* by Dr. Daniel Jones [6].

Making it Stick: Testing Yourself

Another very useful study adjunct while on a Surgery clerkship is *Surgical Recall* [7], a study guide developed by Dr. Lorne Blackbourne when he was a medical student at the University of Virginia. It is currently in its 9th edition, and more copies of it are sold each year than there are third year med students in the entire United States. Here's what the cover of that book looks like:



You can snag a new copy of this book for about 50 dollars, while used copies can be bought for as little as five dollars. This book is set up with simple questions and simple answers, which feels very much like the rhythm of the usual Socratic method of teaching used in the operating room, in the clinics, and on rounds. There are, by the way, more than 30 other Recall books, one for almost every discipline in medicine. And, there is even *Advanced Surgical Recall* [8], also edited by Dr. Blackbourne, which was developed for Surgery residents.

Learning to Teach is a Skill to Hone Early

Teaching concepts or procedures to others is one of the best ways to solidify your own knowledge and to identify your own knowledge gaps. Teaching requires at least some mastery of a topic which can allow you to accurately convey new information to another learner. Questions from someone that you are teaching can also prompt you to expand your own knowledge. Furthermore, forming study groups with your peers on a shared rotation can also be a useful way to enhance your learning. As you progress through the medical educational system, teaching will be one of your responsibilities, so learning to teach is a skill that you should begin honing early in your educational trajectory.

Do not Depend on Studying Multiple Choice Questions

A strategy to avoid is studying multiple choice questions, although practicing a few questions of this type can be useful, on a limited basis, to test your mastery of the information you are studying. The reason that trying to actually learn from these types of questions is that using them may leave you with more uncertainty and ambiguity than is optimal.

However, you can use multiple choice questions strategically throughout your rotations to aid in your understanding of key surgical concepts at the level at which you should be learning and understanding these concepts as a medical student. As you progress, multiple choice questions can also be used as an assessment tool to identify your knowledge gaps. All learning through question banks, should, of course, be supplemented with additional reading of textbooks, journal articles, and other source materials.

Reflecting on What You are Learning

Another useful strategy for ‘learning on the go’, which may sound more like advice for residents than for students, is to write down some reflections on what you have seen, heard, or experienced each day. There is something to be

said for writing these kinds of notes by hand in a notebook, such as a Moleskine notebook or one of the Field Notes notebooks mentioned earlier.

To Teach is to Learn Twice

Another simple but very effective strategy for optimizing learning on clinical rotations is to look up at least one thing every evening that was discussed on rounds that day and to then mention what you learned that night on rounds the next day, preferably when you return to the patient’s room where the original question came to your attention. You will, most certainly, remember these bits of information very efficiently. After all, one of the oldest adages in medicine is that ‘to teach is to learn twice’, and sharing a bit of information that you have looked up with your team does count as teaching! Furthermore, if you set an example by doing this, others will follow your example. That sharing will be good for all concerned, obviously.

Learning from Your Patients

It is worth emphasizing how efficient and effective learning from your own patients can be. When you combine the stories of your patients with the information you have learned about them, you will create memories that last.

The Most Important Lessons

After all your years of studying and learning things that you sensed that you could forget as soon as a class is over (like Calculus or Organic Chemistry), the things you will see and experience, once you start into your clinical rotations, may well be things that you might not see or hear about again until a patient’s life hangs in the balance. Furthermore, we must all remember why we have chosen to enter the medical field, which is to help each and every one of our current and future patients deal with or recover from what ever treatment we are providing to them.

Summary

There is truth to the old saying that ‘what got you here won’t get you there’. That is, the old ‘tried and true’ study strategies that got you through college and the early days of med school are not optimal for clinical learning in a busy clinical arena. You simply must adapt to and have strategies for ‘learning on the go’. We hope that the suggestions we have described will provide some guidance to medical students on clinical rotations, especially those in surgical disciplines.

Author Notes

Dr. Skylar Rodgers is a senior resident in the Surgical Residency Program at the University of Mississippi. She is currently engaged in a two-year surgical research program at The University of Virginia. Dr. Curt Tribble is The David A. Harrison Distinguished Educator and a Professor of Surgery in the Division of Thoracic and Cardiovascular Surgery at The University of Virginia.

Author Contributions

SR and CT conceived and wrote this paper. Substantial contributions were made by both authors. Both authors worked on drafting and reviewing the content. Both authors approved the final version of this paper. And, both authors have agreed to be accountable for all aspects of this paper.

Ethics Approval and Consent to Participate

Not applicable.

Acknowledgment

I must give a tip of the cap to my all-time favorite comic strip, Calvin & Hobbes, the demise of which I still mourn. The title of this essay is intended to honor that comic strip and the author of it, Bill Watterson. CGT

Funding

This research received no external funding.

Conflict of Interest

The author declares no conflict of interest. CT serves as associate editor of this journal. CT declares that he was not involved in the processing of this article and has no access to information regarding its processing.

References

- [1] Behind the Knife Podcasts. Available at: <https://behindtheknife.org/> (Accessed: 22 April 2024).
- [2] Lawrence P. Essentials of General Surgery and Surgical Specialties. Wolters Kluwer: Philadelphia, PA. 2018.
- [3] Tribble C. A Practical Minded Obsession: With the Possibility and Consequence of Failure. *The Heart Surgery Forum*. 2016; 19: E1–E4.
- [4] Tribble C, Teman N, Merrill W. The Calm Before the Storm: The 4th Year of Medical School prior to a Surgery Residency. *The Heart Surgery Forum*. 2021; 24: E451–E455.
- [5] Meador CK. Remembrance of Things Past. Chapter 23. *Fascinomas: 85-88*. First Edition. CreateSpace Independent Publishing Platform. North Charleston, SC. 2013.
- [6] Goldfarb M, Gromski M, Hurst J, Jones D. *Pocket Surgery*. Lippincott, Williams & Wilkins: Philadelphia, PA. 2011.
- [7] Blackbourne L. *Surgical Recall*. Wolters Kluwer: Philadelphia, PA. 2021.
- [8] Blackbourne L. *Advanced Surgical Recall*. 4th edn. Wolters Kluwer: Philadelphia, PA. 2014.

Additional References

While this essay is focused on learning during a Surgery Clerkship, we have written essays that cover additional aspects of meeting the various challenges and of enjoying the many transitions of medical education and training. A list of some of those essays is included here:

- [1] Ely S, Tribble C. The White Coat Ceremony: Welcome to the Medical Profession. *The Heart Surgery Forum*. 2022; 25: E843–E848.
- [2] Tribble C, Teman N. Zen and the Art of Thriving in the Clerkship Year of Medical School. *The Heart Surgery Forum*. 2023; 26: E192–E201.
- [3] Tribble CG. Gimme 3 Steps (With a Nod to an American Rock Song from the 1970s). *The Heart Surgery Forum*. 2016; 19: E080–E081.
- [4] Tribble CG, Walters D. Preparing for the Lurch into a Surgery Clerkship. *The Heart Surgery Forum*. 2019; 22: E172–E179.
- [5] Tribble C. You Either Pull Freight or You are Freight, Admonition #1 for Third Year Medical Students on a Surgery Service. *The Heart Surgery Forum*. 2024; 27: E076–E083.
- [6] Tribble C. The Well-Tempered Clinic: The Clinical and Educational Importance of Cardiovascular Surgical Clinics (With a nod to Johann Sebastian Bach). *The Heart Surgery Forum*. 2020; 23: E712–E717.
- [7] Tribble C. I Need You to be Me: Talking with Our Patients, Their Families, and Their Doctors. *The Heart Surgery Forum*. 2023; 26: E428–E435.