Life planning for the busy surgeon: balancing your career with family and personal life

Aurora Pryor

1Department of Surgery, Duke University Medical Center, Durham, NC, USA

We all are driven for success before we enter a career in surgery. It takes a competitive edge for us to get into medical school and still a greater drive to select surgery as a specialty. We are taught to spend whatever time we can in the hospital to help effect optimal patient care. Our culture drives those of us in academic medicine to spend our limited free time teaching, doing research, writing papers, or giving talks. In clinical practice, we try to squeeze in that extra case for a friend of a friend.

Despite these demands of our careers, most of us still find a way to seek out a willing spouse or partner, and many of us eventually have kids. Those commitments also require time and effort. We all need personal time. How can we find the right balance and be successful both at home and at work? Although no magic answer exists for everyone, I’d like to share my personal experiences and let you in on some “secrets” of my success.

The ultimate tenet for how to balance your time is to be sure you enjoy both your job and your time at home, or you will regret when you’re away from either. I think the happiest people enjoy all facets of their life. If either work or personal life isn’t satisfying, instead of ignoring the problem, you should investigate the cause and troubleshoot. The solutions can be myriad, so you need to focus on what is right for you personally. There also are things that you can do both at work and home that enable balance in life. I will try to delineate these key points.

A. Pryor · A. Torquati
Department of Surgery, Duke University Medical Center, Durham, NC, USA

S. L. Bachman
Department of Surgery, University of Missouri, Columbia, MO, USA

P. M. Fisichella · R. L. Gamelli
Department of Surgery, Loyola University Medical Center, Stritch School of Medicine, 2160 South First Avenue, Room 3226, Maywood, IL 60153, USA

A. K. Madan
Los Angeles, CA, USA

B. D. Matthews
Department of Surgery, Washington University, 660 S. Euclid Avenue, Campus Box 8109, St. Louis, MO 63110, USA

J. B. Matthews
Department of Surgery, University of Chicago, 5841 S. Maryland Avenue MC5029, Chicago, IL 60637, USA

D. Stefanidis
Department of General Surgery, Carolinas Medical Center, Charlotte, NC, USA

D. R. Urbach
Divisions of General Surgery and Health Care and Clinical Decision Making, University Health Network, University of Toronto, Toronto, Ontario, Canada
Streamlining at work to allow family and personal time

Efficiency and multitasking are the keys to successful time management. This is true both at work and at home, but particularly at work. In an academic practice, linking your research interests with your clinical or educational pursuits can allow you to use your time more effectively. For instance, by researching education while teaching, you can effectively do both. This efficiency extends beyond the academic environment. I have been able to have “family dinners” in the hospital on a slow in-house call night and have had wonderful and unique family vacations linked to academic meetings. There is no right way to multitask, but I try to do it whenever possible.

Good support and partners at work also are critical. My practice at Duke University truly is a team practice. I have four partners in our MIS and Bariatric practice, and we honestly share call. One in four nights, I take call for the practice. On the nights I am off call, I am expected to be unavailable, and I can trust my partners to take good care of my patients. Trusting your partners is critical to this and circles back on the tenet that to be happy at home, you must also be happy at work. Selecting a job that has reasonable call responsibility also helps facilitate free time. Although the practice call is one in four nights at Duke, it is taken with a fellow who has attending privileges, so I rarely go in at night except to operate. The exception to this is when I’m on general surgery call, which occurs only three or four nights per month. Finding a practice such as mine with minimal commitments on nights and weekends allows you to have more family time.

Choice of specialty also has an impact on lifestyle. Focusing on minimally invasive surgery allows me to do major surgical procedures but requires less inpatient care. I also try to condense my clinical workweek as much as possible, to minimize days that I need to do rounds in the hospital. Having some control and flexibility with scheduling also allows traveling for work or fun, or time off to attend family events, such as a school play.

When planning your schedule, allow for administrative time to catch up on paperwork, to focus on academic pursuits, or to use for personal issues such as doctor appointments. If you can accomplish these tasks in your regular workweek, they will have less impact on your life at home.

Setting up a supportive home situation

Stability at home helps to facilitate productivity at work. The number one piece of advice is to get help! Do not hesitate to hire someone to clean your house or do your laundry. If you don’t enjoy yard work, hire a lawn service. It is much less stressful for you and your family to have someone take care of these things. Cutting down on the weekend or evening “to do list” is a great way to create free time.

There are many ways to create a good home situation with kids, but I think there are several keys to doing it as a successful and busy surgeon. The central theme to a good home life is picking the right spouse. I’ve been extremely lucky to have a supportive and helpful husband. Having a true partnership in our marriage is empowering to my career. But to make it fair, I also have to be supportive of my husband and realize when he needs me to cook, pick up the dry cleaning, or just be available to listen.

If you have kids and expect to keep a career, you also need to give up some control with your kids. The control can either be shared with your spouse, or as in my case, you can acknowledge that your childcare provider really is acting as another parent. Admitting that and appreciating the close relationship a childcare provider can have with your kids is essential. It’s also important to understand that you can’t always be a perfect parent (although as a driven surgeon, you’ll probably try). Which type of childcare provider is right for you also depends on your particular family’s needs.

My husband and I require a lot of flexibility to meet our busy schedules. When our kids were little, we were uncomfortable with the perceived anonymity of daycare and opted initially for a nanny. Nannies come with a high price tag but can have excellent commitment and flexibility. While I was in my surgery residency, our resources were more limited and after a bad nanny experience, we switched to an Au Pair to save money.

Au Pairs are sponsored on a J-1 visa to travel to the United States for 1 to 2 years to have an educational and live-in childcare experience. Because Au Pair is a government-sponsored program, host families do not have to pay taxes or health benefits, as is the case with nannies. Although some feel it awkward to have someone outside the family circle living with them, it was liberating to our lifestyle. I was able to take call and not worry about finding childcare for the 3 a.m. case when my husband was traveling. I also was able to gain cultural exposure for my family. We now have some great friends to visit as we travel the world! Investigate the options in childcare and try to consider all your needs when choosing.

Combining work and personal life

When you have good childcare, it’s easier to feel at ease going to work or staying late. It also facilitates date nights with your spouse, which are essential to keeping a healthy marriage. It’s important to remember that your kids will still think of you as their parent and look to you for ultimate approval. To keep that relationship strong, I make
sure to schedule undistracted quality time with my kids. I make an effort to attend as many of their school events as possible and to give my full attention when in attendance. I also expand on family time by multitasking at home. For example, I often change my solitary running time into family exercise plans, getting my husband to run with me and the kids to bike along. I believe that my family won’t focus on the times I wasn’t there as long as we find predictable quality time together.

Other ways to improve multitasking and efficiency are to go to family-friendly meetings and roll in a vacation. Choose flights to minimize time away when you travel solo. If you can’t finish deskwork in the office, still come home early, but work at home after the kids go to bed if you have to. To improve family time, we try always to eat breakfast and dinner together. When you are more efficient with family and work time, it leaves more time for you.

These are the pearls that have worked for me. Although we all have different needs, I hope this helps you to be a little more efficient and multitask to create some good quality fun time.

**Selecting an appropriate mentor**

Sharon L. Bachman

Mentorship as we know it was first described by Homer in *The Odyssey*. Odysseus left his son, Telemachus, in the care of his trusted advisor, Mentor. Mentor provided advice and counsel for Telemachus as he grew in the absence of his father, who was fighting the Trojan war.

Surgical and scientific mentoring can be defined in multiple ways: as a person who has achieved career success then counsels and guides another for the purpose of helping that person achieve like success [1], in a personal one-on-one relationship between a more experienced scientist and a junior scientist [2], and as a senior faculty member who advises or guides a junior faculty member in matters relating to achievement of academic success [3].

This can be a subtle process, especially in the scientific world. A mentor can help acclimatize a student to this strange new environment more quickly, as described well in the following quote from Carl Djerassi: “Science is . . . a community with its own customs, its own social contract. Members of that community pride themselves on their abstract languages and their tribal customs. Their tribal behavior is acquired largely by intellectual and cultural osmosis from their mentors and their peers, rather than from textbooks.”

Although an advisor can be a mentor, advising is a professional relationship, whereas mentoring is a personal relationship. Mentoring depends on the quality of that relationship, and a mentor takes a special interest in helping another person develop into a successful professional [4]. A mentor combines the qualities of advisors (people with career experience willing to share their knowledge), supporters (people who give emotional and moral encouragement), tutors (people who give specific feedback on a learner’s performance), masters (employers to whom one is apprenticed), sponsors (sources of information about opportunities and an aid in obtaining them), and models of identity (the kind of person one should be to be an academic) [2].

The characteristics of a good mentor include the ability to share technical expertise, wisdom, and life experiences. Mentors are good listeners, good observers, and good problem solvers. They make an effort to know, accept, and respect your goals and interests, and a good mentor may help build a network of mentors and introduce you to other appropriate mentors [4]. Consider the following when you select mentors. They should have an interest in contributing to your career development, research accomplishments, and connections for professional networking. They also need to be accessible, available, and approachable. Ideally, they should have past successes cultivating the professional development of others. Other traits of good mentors include empathy, open-mindedness, consistency, patience, honesty, savvy, confidentiality, creativity, and detachment. Very importantly, a mentor must be someone who is not threatened by you or predatory. Reading this list may make you despair of ever finding a mentor because very few of us are so perfect! But finding a mentor with a genuine interest in you and your career is going to lead to the most fruitful relationship.

Mentoring should benefit your mentor as well as you. While the protégé gains guidance and experience, the mentor benefits from the trainee’s energy and ideas. The mentor and the department gain the satisfaction of producing a successful surgeon.

If you realize you need mentorship, seek it out actively. Don’t wait to be chosen by a mentor, but proactively approach someone you respect or hope to emulate and ask for that person’s advice or input. This can be facilitated by asking for comments on a paper or project and accepting constructive criticism. This demonstrates the protégé’s willingness to be mentored and to receive direction and advisement [5].

When selecting a mentor, ask yourself if the person is someone with whom you can develop a good productive relationship. It is helpful if your mentor has a compatible style of communication, although many mentor–protégé interactions are intergenerational. A mentorship may evolve over time, but it may take your initiative. Try to ascertain what kind of support you need, what ways a
Mentors can help you, and who is the right person to provide this mentorship. Audition potential mentors by watching them actively at work, at the bedside or in the operating room, at seminars, and at presentations or meetings. Find out from others who successfully mentored them, and who supported them through tough times. Make sure that a mentor will foster your independence. Realize that there are benefits you can give to your mentor, namely, your skills, expertise, and enthusiasm [6].

The classic system of one mentor, one trainee also is changing. Because the ability to be a “triple-threat” surgeon is extremely difficult in the current health care environment, it is necessary to have different mentors for different parts of your career. A scientific mentor may help with research, teaching, presentation, publication, grantsmanship, and lab management and politics. An academic mentor may help with clinical skills, networking, policies, and procedures relevant to reappointment and promotion, hospital politics, education, practice management, and personal support. A chairman may mentor you on the big picture and the long-range plan of your career, whereas a partner a few years older may be more appropriate for mentoring you on coping strategies for balancing your career and personal life.

It may take time and effort to find a good mentor, but persist! The reward is finding someone who will help support you, challenge you, and always keep your best interests in mind as you continue your surgical career.

References

4. Adviser, teacher, role model, friend: on being a mentor to students in science and engineering. What is a mentor? Accessed xxxx at http://www.nap.edu/readin

Getting the most from the mentor–mentee relationship

Aurora Pryor

Duke University Medical Center, Durham, NC, USA

Mentors can be some of the most valuable allies of your surgical careers. Your mentors can advise you on your career and personal decisions, introduce you to the “right” people, and help to provide opportunities that you otherwise wouldn’t have. Finding appropriate advisors is the first step in finding guidance, but how you manage those relationships can have a major impact on your career. You should have a variety of mentors for different aspects of your life, and your relationship with each one will be different. It is good to have multiple mentors, to get different opinions and to avoid overtaxing any single relationship. For the purpose of this discussion, I subdivide mentors into those with whom you work, those you interact with nationally, and those who offer life advice.

Mentors with whom you work

The most essential thing about mentors at work is that they can understand the day-to-day politics you face and help you make decisions on a local level that will have an impact on your daily life. You should be able to trust your mentors to have your best interests at heart without risk of repercussions from disclosure. That being said, you must remember that there will always be some competition among physicians at the same institution, particularly if you share the same specialty and can have an impact on each other’s referral base. Most surgeons are happy to help you grow your practice, but you need to be sure that this practice growth does not come at the expense of your advisor’s practice growth. It is smart to keep a positive outlook when possible and to try putting a positive spin on things if you can. I find that having a good attitude can go a long way with troubleshooting and make others more eager to work with you.

When your coworkers are also your advisors, try to find ways to collaborate for mutual benefit. I have done research projects and edited books with my local mentors. In general, this means that the mentor provides either the opportunity or the resources to help you accomplish that goal. Developing new opportunities for both of you also is a way to achieve mutual gain, such as bringing in a new technology with the support and encouragement of an advisor.

Another example is serving as co-director for a course that your mentor chairs. In that situation, your mentor may draw in a larger group of students with their reputations, but you also are exposed to those students, and your
reputation will grow. It is important in these situations to work hard at doing well because it will reflect on both your and your advisor. As you start to shine, good mentors will be proud of your accomplishments.

**Mentors you interact with nationally**

Mentors on a national level usually are met through meetings and courses. They also may have been your teachers during your training. These mentors may have well-established connections in surgical societies that they can use to help you gain notoriety. The most important thing to do when your mentor creates an opportunity for you is to say “yes” and use it well. If your mentor recommends you for a position and you excel at it, this reflects well on both of you. You will continue to grow opportunities in that way. If for some reason you are unable to give an opportunity your 100% commitment, turn it down with a good excuse. But use caution. If you turn something down, you are much less likely to have another invitation.

Because you don’t work with your national advisors on a daily basis, you need to find opportunities to touch base. This can be as simple as a few words exchanged annually at a national meeting or an occasional phone call or lunch. Do not take it personally if your mentor is overcommitted and has trouble finding a meeting time. Good advisors often are busy but will think of you as opportunities present themselves. Do not hesitate to email your mentors with specific career questions, particularly if you are considering a career change or a new opportunity and need advice on which path to choose. Most surgeons will be able to schedule time for a phone call, even if only for 15 min. I find that surgeons with whom you don’t work will give you the best advice on salary and promotions. They also are very impartial when sorting out political issues.

**Mentors who offer life advice**

I consider mentors who offer life advice to be people capable of pulling off the entire package of what a surgeon should be. These people are true role models in every sense of the word. Mentors who fit this description can offer advice on the little things that make life better including things such as childcare, selection of an academic track, or a great restaurant for the valuable date night. Life mentors do not necessarily have to be in your specialty or even in medicine. It usually is helpful for these advisors to have pulled off a busy professional life if they are giving you advice on balance. I have the most fun getting together with my life mentors because they also can be good friends.

**Putting it all together**

There are many ways to manage your mentor–mentee relationships, and each one will be different depending on your needs and their assets. The point to remember is that good mentors will enjoy helping you and watching your career grow. Make a point to have some social time with your advisors when possible. It is encouraged that you send an occasional email to ask for advice. Most mentors will be flattered that you asked.

**Grant planning: designing and implementing a research study**

Brent D. Matthews

*Department of Surgery, Section of Minimally Invasive Surgery, Washington University School of Medicine, 660 S. Euclid Avenue, Campus Box 8109, St. Louis, MO 63110, USA*

**Correspondence to:** Brent D. Matthews
Phone: 314-454-7195
Fax: 314-454-5396
email: matthewsbr@wustl.edu

“He who seeks for methods without having a definite problem in mind seeks for the most part in vain” (David Hilbert, 1862–1943, German mathematician).

A research study is an organized investigation of a fundamental question or questions that can be answered by the collection and analysis of information, and the study design is an analytical approach to conducting the investigation that serves as a blueprint for implementing the research. A research study needs scientific rigor. It must be conducted in accordance with established ethical standards and maintained through meticulous and detailed record keeping. It must use methods of measurements in an objective manner to provide valid and reliable results. The results of the research study should be analyzed and interpreted using standard and appropriate statistical methods that can be reanalyzed by independent investigators who can reach similar conclusions or can replicate the study to confirm or refute the results.

All research studies have a life cycle. The life cycle begins with identification of the need for a research study and development of a research question. It ends by communication of the results through presentation, publication, or both.

According to Murphy’s Law, “anything that can go wrong will go wrong.” A thorough and meticulous approach to designing a research study will minimize inevitable
Identifying the need for a research study and developing a research question are interrelated. The research question should be expressed in sufficient detail so that the study strategy and analysis methods are not only understandable, but also justified. Overall, this will define the purpose of the research study and ensure that it does not duplicate previous investigation \([1]\). Typically, a clinical research study addresses significant gaps in current knowledge or explores a scientific idea in a more intellectual manner than the previous investigation. However, a previous research study may be repeated to confirm or extend findings from a homogeneous, idealized cohort to ensure that results apply to a local or demographically disparate population.

Before starting a research study, an investigator needs to do sufficient background research to justify the necessity and feasibility of answering the research question. It is essential to consider whether another investigator has already answered the research question. All relevant information on the subject needs to be examined, including published and unpublished literatures and their bibliographies, abstract presentations from scientific meetings, and any communication from experts in the field. The foremost publications on the research topic that have contributed knowledge to the area should be carefully reviewed. The principal investigators of these publications should be noted for their comprehensive literature search. Communication of research ideas with leading authorities in the area of interest may help to formulate the research question and narrow the focus of the investigative study.

In formulating the research question, study collaborators are identified, and mentors and colleagues are contacted to help refine the study question. Because determining the purpose of the research study and defining specific aims provide the foundation for the study’s design, considerable effort should be expended during this preliminary phase. Ultimately, this preliminary work leads to the selection of study objectives.

**Study design and resources**

The study protocol is the blueprint for implementing the research study, outlining the working plan, and justifying the study. It serves as a formal document of the research study and characteristically contains the following sections: Background, Objectives, Methods and Procedures, Statistical Design and Analyses, Budget, and Milestones.

Depending on the funding source, grant applications will have unique structured research plans. Multiple research designs are used including an informational search (literature search), a metaanalysis (literature search with data analysis), a descriptive sampling or analytical survey (representation of the study variable under investigation by random selection of study units), an observational approach (in situ evaluation of a nonrandomized study group or a cohort if the study is case controlled), or an experimental approach (defined comparisons between treatment responses either by directly controlled extraneous variables or by randomization of their influence if the study is a randomized controlled trial). The design of the research question will determine what type of research approach is most appropriate and provide the initial step of designing and implementing a research study.

The research strategy will be determined not only by the research question but also by available resources. Although funding is the primary resource to facilitate a research study, additional considerations should be given to the balance between clinical responsibilities and the time available for research; the availability of coinvestigators, consultants, and statisticians; and access to library facilities, multimedia, and information technology with statistical and bibliographic software packages. A realistic timeline with milestones to complete the research study should be defined.

The background is established during development of the research question and identification of the need for a research study. The Background section defines the problem to be investigated and its relative significance. This section provides insight into long-term research goals. Relevant published and unpublished literature should support the question to be answered and the premise for investigating it. Occasionally, preliminary investigation by the principal investigator is the scientific justification for designing the research study and applying for extramural funding. This often is the natural evolution of quality clinical research. A critical appraisal of preliminary studies by an independent evaluator may be required to eliminate internal bias from the principal investigator and the research group.

The Objectives section describes the unifying theme of the research study, which facilitates the formulation of a hypothesis. The hypothesis must be testable, and the variables selected to be measured must be measurable. The objectives should be expressed in detail sufficient to make the study strategy and analysis methods clear. The research design should be implemented in a manner that confirms or invalidates the hypothesis. If the hypothesis is too broad or vague, it may not have clinical relevance. The objectives are expressed as specific aims, detailed components of a broader research question described in the Background section. The specific aims should be focused, logical, and capable of testing the hypothesis.
The Methods and Procedures section includes study subject selection and participation, sample size calculations, and measurement techniques to evaluate outcomes. Study subject selection and participation describe the conceptual basis by which study subjects are selected and the eligibility criteria for inclusion and exclusion of subjects for the study. The procedures for enrollment, recruitment, and follow-up evaluation are explained.

A defined sample size is required in quantitative research for scientific validity and should be unequivocally justified. Failure to consider sample size represents one of the most prevalent problems in clinical research. The sample size delineates the chance (power) of detecting as statistically significant the magnitude of effect specified by the research question or questions: as a general principle, the more frequent the event rate in a population and the smaller the effect size (e.g., 5% difference vs 25% difference), the fewer the patients required for the research study. Sample size will affect several important variables of a research study, specifically, the timeline for completion of the study as well as the cost and funding required to execute the study.

The outcome variables to be measured should be distinct and unambiguous. The potential confounding variable should be recognized and considered in determining appropriate measurement methods as well as the validity and repeatability of the study. Validity and reliability are easier to achieve when metrics established in the peer-reviewed literature (i.e., Medical Outcomes Survey Short Form 36 [SF-36], Brief Pain Inventory [BPI]) are used. Invalidated measurement methods will cast doubt on the results of any study.

Statistics are invaluable for substantiating research study conclusions. The Statistical Design and Analyzes section defines how the data will be coded, entered, and evaluated. An epidemiologist or biostatistician can provide expert advice not only to determine sample size but also to define appropriate statistical methods for the research study. Statistical details and analytical methods must be consistent such that paired or matched data versus categorical or continuous data are analyzed using appropriate statistical models. The research study may include provisions to stop the study early based on an interim analysis. The rationale for performing an interim analysis is both ethical and economic. Occasionally, “outliers” will be eliminated from the statistical evaluation. This should be declared during study development and design with a justification. The Health Insurance Portability & Accountability Act (HIPAA) of 1996 requires protection of confidentiality and security of health information and data. Researchers have to notify patients of privacy practices and security standards protecting the disclosure of personal health information. Individuals must be informed of uses or disclosures of their medical information. It is necessary to integrate HIPAA into the research study design.

The Budget section displays a reasonable estimate of the financial support required and the intended use of funds sought to complete the research study. To justify the funding and support the research, transparency and honesty are imperative in providing cost categories for the external funding sources. A typical budget format includes direct costs such as salary and wages for the research personnel (principal investigator, co-investigator(s), technicians, and so forth, with fringe benefits) and expenses for capital equipment, materials and supplies, travel, publication, consultants, and subcontractors, as well as indirect costs, namely, facility and administrative costs for the university or research institution. Current and pending financial support and proposals may have to be declared as required by many funding agencies.

The Milestones of a research study begin with development of a timeline. There is not an indefinite amount of time to complete a research study, although research should not be hastily completed, sacrificing the quality or integrity of the study. The timeline defines the research stages from proposal (defining a research question) to the communication of results. The timeline should specify the tasks to be completed at each phase. The Milestones of a study include defining a research question with objectives and specific aims, completing a research protocol, acquiring institutional review board approval, securing research funding, enrolling patients, analyzing data, and communicating results.

Implementing and maintaining the research study

All institutions of research have an institutional review board (IRB) to ensure that investigators meet federal guidelines for the protection of human subjects. The primary function of the IRB is to assist the investigator in meeting these protective guidelines. Approval from the IRB is required before initiation of human subject research apart from a few exceptions. Institutions have standardized forms and procedures for submission of a research protocol. The IRB representatives can assist, providing direction or clarity to the submission process.

The IRB also is responsible for the continuing review of ongoing research at intervals determined by the degree of risk, but not less often than one every year. Any changes in the way a study is conducted must be reviewed and approved by the IRB before implementation of the proposed changes (i.e., recruitment methods, study procedures, correspondence with subjects) except when a change is necessary to avoid patient harm. Significant adverse events are reported to the IRB for oversight, and consideration of changes in the research protocol or informed consent is required to protect the safety and welfare of the study participants.
Analyzing research data involves referring to the original research question to organize the data and focus the analysis. Analysis for quantitative research requires three separate steps: data preparation, descriptive statistics, and inferential statistics. Data preparation includes logging the data, inspecting the data for accuracy, entering the data into a computer database, transforming the data, and developing and documenting a database structure. Descriptive statistics detail the basic features of the data, providing summaries about the samples and measures. The descriptive statistics form the basis for all quantitative data analysis. Inferential statistics conjecture conclusions extending beyond the immediate data alone through investigation of the research hypothesis with analytical models (e.g., t-test, analysis of variance, regression analysis).

Validity and reliability are key characteristics in quantitative research. Validity refers to the accuracy and truth of the data, and reliability refers to the consistency and dependability of the measuring instrument. Interim reports can be evaluated by the data and safety monitoring board to ensure the safety and welfare of patients.

The science of a research study depends on precise communication of its results and conclusions. Research results can be disseminated by an abstract, oral communication, a scientific manuscript, or a combination of all three. The abstract describes in concise terms the topic, the methodology, the principal findings, and the conclusions. The abstract may serve as the primary communication of a research study for evaluation by an academic surgical society for subsequent presentation. The abstract also may be the main source of indexing terms and key words after publication. It prepares the researcher for academic presentation through development of a scientific manuscript.

A scientific manuscript is a comprehensive written research report. Its framework includes an abstract, introduction, experimental details, results, discussion, conclusions, summary, and references. A peer-reviewed publication disseminates the experimental findings to the academic and health care community, provides closure to methods evaluating the specific aims, and provides impetus for continued funding and investigation of the research topic [3].

Surgical research allows for the practical application of basic scientific knowledge to patient care through intellectually creative methods of scientific exploration and investigation. The process of designing and implementing a research study parallels the process of clinical decision making. It delineates a focused question, devises a method to address the question, accumulates data, analyzes the data, and draws relevant conclusions based on the data [4]. A systematic approach to designing a research study with contingencies for logistic and practical problems during implementation will foster success in clinical investigation.

**References**


Points Which Make a Grant

Dimitrios Stefanidis

Carolinas Medical Center, Charlotte, NC, USA

Grants are sums of money awarded to finance a particular research project or activity. They can be very important for the career of the academic surgeon because promotion and academic advancement may depend on their acquisition. In addition, research grants enable academic surgeons to complete their research projects successfully. This chapter provides guidelines that characterize a successful grant application.

Planning the application

The first step for every grant submission is to plan the application process. This includes assessing the needs of the applicant’s field and brainstorming ideas with colleagues to identify important research questions that have not been addressed and would be valuable to the field. A complete literature review will help refine these ideas and research questions and may identify potential competitors for the grant. A careful assessment of personal strengths and weaknesses, available institutional resources and support, and most importantly, the time commitment required, will clarify the feasibility of the project. During this process, the applicant also should identify which funding agency would be the most likely to have an interest in the research topic. Early contact with responsible agency representatives will help to identify what types of projects the grantor will and will not fund and who the evaluators (grant reviewers) are. This will enable the applicant to form an objective opinion about the chances for funding. If possible, it is helpful to obtain prior successful applications to review and get a feel for the writing style.

When the decision is made on the potential funding agency, the applicant should review the submission deadline and assess which funding cycle is most feasible. It is imperative that the applicant be realistic about the time and effort required to prepare the application and to complete the project.

In general, it takes about 1 year to collect preliminary data: 1 to 2 months for institutional review board (IRB) and/or IACUC approval, 1 to 2 months to write the grant, 5 to 6 months from submission to review, 1 to 2 months to receive the review and decision, and about 9 months from the moment of submission to funding.

Grant components

Although different funding agencies use different application formats (the applicant should be familiar with these and observe them strictly), the main grant sections included by most agencies are abstract/project summary, background and significance, preliminary work, hypothesis and specific aims, research design and methods, budget, assurances, available resources, and investigator curriculum vitae.

Abstract/project summary

This section usually is limited to one page and includes a concise summary of the proposal. It should include a brief background, the specific aims or hypotheses, the unique features of the project, the methodology (action steps) to be used, the expected results, the evaluation methods, a description of how the results will affect other research areas, and the significance of the proposed research. This section should be brief but complete, clear, and enticing. The applicant should use all the allotted space and write this section last to reflect the entire proposal.

The abstract/project summary should be viewed as a one-page advertisement for the project. This gives the first impression to the reviewers and should be constructed very carefully. Although you can’t win the grant with the first page, you can lose it with that page!

Background and significance

The background and significance section describes the “why” of the proposal. Why is it worth doing and funding? This section should include the problem to be investigated, the rationale for the proposed research, a critical focused literature review and identification of knowledge gaps, and how the results of the proposed study will fill those gaps. The applicant should make a compelling argument for the importance of the proposal, stress its strong points (e.g., innovation, new strategies), and highlight the broader applicability the findings may have. It is important to master the existing literature and demonstrate good understanding of the work that already has been done and the work that needs to be done. Don’t forget to include the work of potential reviewers.
Preliminary results/pilot work

This section affords the opportunity to demonstrate competence in conducting a research project and to prove the feasibility of the proposal. By describing prior experience with the proposed subject, the applicant can demonstrate that he or she has the skill to conduct a study and provide support to the hypothesis. A summary of critical preliminary findings that support the hypothesis and research design is needed. Any resultant publications should be included at the end of the proposal. Planning is very important because accumulation of preliminary data can be very time consuming.

Power analysis

More and more agencies require a power analysis with the submission of a grant proposal. Power is the capability of the study to detect a difference between study groups when a difference really exists. Scientific literature is replete with underpowered studies that lead to wrong conclusions. The purpose of the power analysis is to minimize the reporting of false-negative data due to a type 2 statistical error committed during the analysis of the results. A type 2 error occurs when a true difference exists between study populations but the number of subjects is insufficient to detect this difference. Thus, the study power, usually set at 0.8 (i.e., a 20% chance of reporting false-negative data), helps investigators estimate the sample size needed for their study population.

Hypothesis/specific aims

This section describes the “what” of the proposal. It should include the main idea or goal of the study by giving a concise and realistic description of what the proposed research is intended to accomplish. It should also include two to four specific time-phased research aims and objectives. Here, the applicant should convince reviewers that the hypothesis is testable. Specific aims that directly target the hypothesis should be included. The aims should be relevant but not interdependent, which will avoid all aims failing if one fails. The applicant should focus on goals that can be supported with pilot data or expertise and avoid losing focus by including an unrealistic hypothesis or citing too many aims.

Research design and methods

Adequate explanation of the project’s research design is critical to the success of the proposal. This section describes the “how” of the proposal and will be reviewed very carefully. It should include an overview of the experimental design and a detailed description of the specific methods including data collection, analysis, and interpretation. Reference to expected results, potential difficulties, limitations, how these will be overcome, and what alternative approaches will be used demonstrates the investigator’s maturity and should be included. The applicant should explain and justify why the chosen method/approach is better than alternatives and be sure to include control conditions. The inclusion of a timetable is imperative because it demonstrates thoughtful planning, organization, and the feasibility of the project. The methods should be described succinctly and in sufficient detail so they can be easily understood by a nonexpert. Supportive publications (preferably authored by the applicant) should be cited, and an algorithm/graph of the research design should be included to aid reviewers’ understanding. The applicant should seek out and document collaboration in areas important for the project when he or she has limited expertise.

Budget and justification

This section presents and justifies all the expenses required to achieve the project aims and objectives. The main components include personnel, consultants, equipment, supplies, travel, and other expenses. The applicant should provide a brief description of duties for all proposed positions, identify specific individuals for each position, and quantify their anticipated effort. In addition, a justification should be provided for equipment purchases and supply costs (detailed), project-related travel costs, and included consultants. The applicant should be realistic and avoid padding the budget or underbudgeting, which reflects naivete and will be recognized by reviewers, likely hurting the proposal. Before submission, the budget also should be approved by the institutional grants and contracts office.

Assurances and applicant qualifications

Assurances are important for granting agencies to ensure that the applicant’s institution will comply with all federal laws and regulations. Both IRB and IACUC approvals should be included in this section, and consideration should be given to their respective submission deadlines so the approval letters are at hand when the grant is submitted. A chairman’s letter of support that guarantees protected time for the primary investigator during the study period also is required. Furthermore, collaborators should provide the principal investigator with letters of intent. Demonstrating that the applicant can execute the proposed study and has adequate facilities and resources to complete the research is critical. The applicant should format his or her CV according to the guidelines and include/highlight proposal-relevant publications and achievements. There are many qualified applicants, and a strong CV does not guarantee funding.
Overall grantsmanship

The quality of the proposal presentation is very important. The text of the proposal should be visually stimulating, soothing, and user friendly for the reviewer. Graphs and pictures essential to understanding the proposal should be used effectively. The applicant should use concise sentences and avoid jargon, spell out acronyms, and be consistent with terms, references, and writing style. Application guidelines and format should be observed strictly including the exact page allotment and the specified type size. The application should be carefully proofread and checked for typos. It is invaluable to have an outside reader review the proposal for clarity and consistency.

General recommendations

Applicants should have a clear and realistic plan for their project and know exactly what they want to accomplish, the steps they will take to do it, and how they are going to measure the success of their project. They should demonstrate their maturity by identifying potential problems or barriers that may be encountered and propose ways to prevent or overcome them when they occur. They should highlight the scientific merit of their proposal and convince reviewers that their study is absolutely necessary for the common good, that it has strong potential to lead to further studies or funding, and that they are the ideal team to take on this project.

Applicants should seek collaboration and outside expertise to compensate for any weaknesses and assemble a team to help with the application process (researchers, writers, proofreaders). Seeking advice, help, and criticism by seasoned grant writers will improve the proposal and increase its chance for acceptance.

Early planning and identification of the most appropriate funders for the project may further improve the chance for success. It also is imperative to plan the application process well so that submission-associated stress can be minimized and errors avoided. Applicants should obtain required assurances and support letters early in the process and submit their proposal before the deadline.

When a proposal is rejected, applicants should not give up. It takes time and dedication to get projects funded, and often the road to success is paved with failures. In case of a rejection, the applicant should carefully review the critique received, fix any identified problems (if fixable), decide if the revised proposal is a stronger proposal, and resubmit it to the same or a different agency.

Finally, when the grant is awarded, the project must be implemented in a timely manner and the money accounted for and spent properly. The execution of the proposal takes much time and effort, which should already be in the applicant’s plans.

In conclusion, a successful application is clear, precise, and easy to read; proposes an enticing idea and testable hypothesis with significant scientific merit; has a detailed, easy-to-understand, and feasible experimental design; has the potential to lead to further studies or funding; and is free of typographic and other errors. Applicant persistence and determination are the keys to success.

Resources

- http://www.sages.org/leadership/committees/research/grants.php
- http://grants.nih.gov/grants/grant_tips.htm
- http://www.grants.gov/
- http://lone-eagles.com/granthelp.htm

Mistakes that will kill your grant

David R. Urbach

Divisions of General Surgery and Health Care and Clinical Decision Making, University Health Network, University of Toronto, Toronto, Ontario, Canada

Correspondence to: David R. Urbach, 200 Elizabeth Street, Suite 10-NU-214, Toronto, Ontario, Canada M5G 2C4

Phone: (416) 340 4284
Fax: (416) 340 4211
email: david.urbach@uhn.on.ca

Abstract Writing research grants is a difficult skill. Avoiding common pitfalls in research grant proposals will substantially improve the chance of a research study getting funded. This chapter outlines common errors that detract from grant proposals and provides suggestions on how to avoid them.

Writing grants is one of the most difficult parts in the process of conducting research in surgery. A grant writer must draft a document that not only describes how to investigate an important health problem in a manner that is as scientifically rigorous as possible. The document also must be appealing in its appearance, interesting (fun!) to read, and as perfect as possible with respect to things such as spelling, grammar, and the particular rules of the grant application. Indeed, grant proposals must be among the “best work” that an investigator will ever produce. And for whom is this document written? Only two or three people are ever likely to read it in its entirety, and only one of those probably will read it with anything approaching his or her complete attention.
Although it’s never easy to get your grant funded, it is far more difficult if you don’t follow the “rules” for successful grant writing. This includes recognizing the fatal flaws of grantsmanship that must be avoided. This chapter discusses fatal flaws that will sabotage your grant proposal and provides suggestions about how to rectify them. It is intended for authors of research grant applications that will be submitted to competitive, peer-review funding bodies including federally financed agencies such as the U.S. National Institutes of Health or the Canadian Institutes of Health Research, as well as disease- or society-based funding organizations such as the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES).

This discussion is not a comprehensive or systematic “how to” (actually, “how not to”) guide to grant writing. However, it does contain numerous pearls of wisdom I have encountered over the years from experienced grant writers, articles, and presentations on how to write great grants, from reading hundreds of other people’s grants, and from my own experience writing successful and unsuccessful grants.

Be sure to give the reviewers what they need

To understand what the grant reviewers need from your grant, you must understand how peer-review committees work. Typically, a grant committee consists of several reviewers (8 to 12) who review a large number of grants (say, 20 to 40). Each grant usually is assigned to two committee members, the one acting as a primary reviewer and the other acting as a secondary reviewer. It is likely that these two reviewers will be the only two people who ever read the grant. These reviewers must read not only your grant, but also several others in the committee (say, 4 to 8). They also must prepare a report on your grant that summarizes exactly what you intend to do and provides a critical assessment of the importance and scientific merit of your project. Keep in mind that your grant’s peer reviewers are extremely busy and will be searching for time actually to read your proposal and complete their reports.

The primary and secondary reviewers must present your grant to the other committee members, none of whom are likely to read your entire grant, and few of whom will read any of it. The primary and secondary reviewers will act as your advocates by describing the importance of your research and its methods to the committee. They also will provide a critical assessment of your proposal’s strengths and weaknesses to the committee.

Do not make your peer reviewers work to get this information! Spoon-feed it to them. Find out what the review criteria are for the particular grant you are writing and make sure your grant addresses them. If the criteria aren’t clearly listed on the description of the application, contact the funding organization or grant committee chairperson to request them. Use bolded headings to indicate which parts of your proposal address which evaluation criteria, using the same language in these headings as that in the criteria for the evaluation of the grant. This is the information that your reviewers will be desperately searching to find. Don’t assume that they will find it on their own. Assume instead that they are trying to complete their report despite numerous distractions (between cases in the operating room or during the flight on the way to the grant review committee meeting).

As you write your grant, pretend that you are giving subliminal messages to your grant reviewer along the lines of “this sentence is where I describe the importance of my research question; please cut and paste this sentence into your report; thank you very much.” Use a heading such as “Importance of the Research Question” so the reviewers know exactly where to find information on the importance of your research question.

Avoid proposals that are too complicated or ambitious

Assume that the reviewers of your grant are educated nonspecialists. The proposal must be written in clear, simple language. Have a colleague read your proposal to ensure that it is easily understandable on the basis of a single, superficial reading. Don’t trust your own opinion about how clear the proposal is. The best grant proposals address a simple question in as straightforward a manner as possible. If you include complex or unfamiliar methods in your proposal, make certain that you describe them clearly and simply. If you think for one moment that your grant proposal is too complex or too difficult to understand, you are correct, and your proposal is doomed.

The best grants are those that pose a very clear, simple, and relevant question, then answer it using a very straightforward approach. Overly ambitious projects, multiple unrelated aims, and objectives difficult to understand often are the result of fuzzy thinking on the part of the applicant. Keep it simple.

Provide specific research aims

Specific aims describe the actual tasks that will be accomplished in your proposed research. These differ from the general objectives of the research (which are general statements about what your research will achieve in terms of advancing knowledge and so forth) or the hypotheses (which are statements of fact to be tested in the process of accomplishing your research aims). Specific research aims always appear on the reviewer’s report. Chances are the
reviewer will cut and paste the aims directly from your grant proposal into his or her report. Therefore, spend a lot of time developing your specific aims. Clearly spell them out. They should simply describe what you intend to do in your proposed research. Make sure each one makes sense in isolation.

**Link the methods to your specific aims**

Each specific aim should be linked to a part of the Methods section. A popular and useful method for drafting the analysis section of a grant is to organize it according to the proposed specific aims and to begin each section with a sentence that starts as follows: “To accomplish specific aim #1 [copy and paste specific aim #1 here], we will … .” Remember that when your peer reviewer acts as the advocate for your grant proposal before the peer review committee, he or she must describe to the committee exactly what your specific aims are and how you will accomplish each of them. Make it easy for the reviewer to do this.

**Avoid boring questions**

Strive to address important and exciting questions in your research. Your proposal must always pass the “so what?” test (i.e., the reviewer should never read your proposal and say “so what?”). You can get a sense of what the important research questions are by scouring the literature, talking to senior colleagues, and in many cases, perusing published “research agendas” that many organizations have put together [1]. If your question is one that others have raised as an important question, state this plainly in your proposal and cite any relevant references that justify it. If your question does not seem as interesting or exciting as you’d like, spice it up by emphasizing how much the answer to your question will contribute to the current state of knowledge or by telling a story that explains why it is important. Tell the reviewers exactly what you will do next once your question is answered. How will it add to what is already known about the topic? What will change as a result of your research? If nothing will change, you are not studying a good research question.

**Don’t sell yourself short**

Grant proposals are not the place to demonstrate modesty. In your proposal, you must buttress your credentials as a scientist and provide reassurance to the peer reviewers that you are a well-trained, experienced, organized, and capable person. Describe your research environment in detail, including all the resources (office space, computers, research assistants, collaborators) at your disposal. If you have formal training in research, highlight this in the application and in your CV. Describe relevant previous contributions in research and emphasize particularly those specific contributions that you have made to projects. “Selling” yourself is a key part of “selling” your research project. Remember the key messages that you are demonstrating to the peer reviewer: (1) Your research question is the most important question that can be addressed at this moment. (2) Your methods are so scientifically sound that they are absolutely the best possible way to address your research question. (3) You are the ideal person to do the proposed research based on your commitment, training, experience, and research environment.

**Don’t start by writing the Background section**

Never start your grant proposal by writing the Background section first. Starting with the background is a bad idea because it prevents you from tackling the most critical parts—the specific aims and the methods—first. Wasting time on the proposal’s background when there are major issues to be resolved about the research question and approach is a losing strategy.

Start by getting the specific aims perfect. The best way to get useful feedback on a proposal is to draft a “one-pager” (your title, one or two lines of background, the specific aims, the proposed research approach, the expected findings, and the significance of the proposed research) and send it to research supervisors, mentors, and colleagues. It is easier for them to read a short document and provide key feedback on the elements of your proposal that actually are important and matter to the peer reviewers. Chances are you will go back and forth with your aims as you receive feedback and decide what methods you will use (and what can be reasonably achieved in your proposal). Then, you can draft the background so that it supports the aims and research approach you have chosen. Because the whole point of the Background section is to make the case that your proposed question and aims are important and must be funded, you will have to rewrite the Background section anyway to match your aims once they are finalized. If you start with the specific aims and methods, you will have to write the Background section only once.

**Be sure to justify the sample size**

It is a safe assumption that your grant will not be funded unless you provide a reasonable justification for the number of subjects to be included. There are important ethical and scientific reasons why research that includes an apparently arbitrary number of research subjects is not appropriate. A key consideration in determining the sample size for your project is the size of the effect you want to
discuss preliminary data

A major concern of reviewers is the feasibility of your proposal, especially your ability actually to complete the proposed research objectives. The best reassurance you can provide to satisfy this concern of your reviewers is to discuss preliminary data. Although it is ideal to present preliminary data that relate directly to your proposed research (e.g., data from a small number of subjects similar to the data you propose to collect in your study), preliminary data could include any original research findings you can think of that are in any manner related to your proposal. This may include data from previous projects that prompted you to propose your current project or data from your unrelated projects that demonstrate your ability to perform the research tasks outlined in your proposal (e.g., biochemical assays, surgical procedures, chart abstractions, interviews).

Follow the rules

Read the application guidelines carefully and follow them exactly. Pay special attention to page limits (you should never exceed the page limits; it also is not a good strategy to leave unused pages) and budget restrictions (some agencies restrict the use of funds for items such as institutional overhead, salary, or stipends for research subjects). Have someone proofread your proposal to check your spelling and grammar.

Avoid dense text

Your grant proposal must not only be a perfect, delightful read, but it also must look great. Think of your peer reviewers when you put together your proposal. It should contain lots of “white space.” Use headings, subheadings, figures, tables, bulleted lists, and boxes to highlight key areas and add visual interest. Summarize your key points often in case the reviewers miss them (they will). Use topic sentences to introduce paragraphs so the reviewers are primed about what to expect while reading the rest of the paragraph.

Don’t focus too much on style

Although a well-written grant will always be more favorably received than a poorly-written one, style cannot save a flawed proposal. If the peer reviewers don’t think your question is important, don’t understand your specific aims, or think your methods are flawed, your proposal will not be funded. Focusing too much on style, especially early in the grant-writing process, is a time waster and a recipe for procrastination. Correcting and recorrecting your sentences gives you the illusion that you are making progress while you really are just going in circles. Also, you want colleagues and supervisors who review your proposal to focus on its key content, not to get bogged down fixing your grammar or writing style.

Start with a point form outline of your complete proposal with all the headings and subheadings (you can use “place-holder” statements for paragraphs that can be added later), your best attempt at your specific aims, and all the key elements of the methods including the sample size. Circulate this document early—and often—to get as much useful feedback as possible.

Summary

Although writing a grant is difficult, it is a crucial part of the research process. It is a skill that can be mastered by following some basic guidelines and avoiding common pitfalls. This discussion identifies several common problems that reduce the chances of a grant proposal’s success and provides recommendations for avoiding them. Interested readers should also consult other resources containing grant-writing tips (e.g. http://www.nigms.nih.gov/Research/Application/Tips.htm or http://www.cihr.ca/e/27491.html#1).

Reference


NIH career development awards

Alfonso Torquati

date: alfonso.torquati@duke.edu

The National Institutes of Health (NIH) is an agency within the federal government that conducts and funds medical research. Constituted by many separate institutes and centers, the NIH is one of eight health agencies within the Public Health Service, which is part of the U.S. Department of Health and Human Services.

As stated on the NIH Web site, the goal of NIH research is to acquire new knowledge to help prevent, detect, diagnose, and treat disease and disability, from the rarest...
genetic disorder to the common cold. The NIH mission is to uncover new knowledge that will lead to better health for everyone. The NIH works toward that mission by conducting research in its own laboratories; by supporting the research of nonfederal scientists in universities, medical schools, hospitals, and research institutions throughout the country and abroad; by helping to train research investigators; and by fostering communication of medical and health sciences information.

Recognizing its critical role in the future of research, the NIH has a long-standing commitment to mentor and provide career development to physician-scientists. The NIH has consistently prompted the development of new investigators through its many research career development awards, also referred to as “K” awards. These awards are intended to ensure a pipeline of well-trained academic physicians by protecting no less than 75% of their effort for research, as well as research and development activities, and by requiring that applicants gain additional supervised experience on their path to becoming independent clinician scientists. Each of the NIH institutes and centers implement these K awards in different ways to accommodate the career needs of researchers working in fields related to their specific missions.

There are nine different career development awards that individuals with a health professional doctorate should consider. Most of these awards support individuals after they have completed clinical training and have accepted a faculty position (http://grants.nih.gov/training/career_developmentawards.htm). In general, surgeon-scientists are eligible for the Mentored Clinical Scientist Award (K08), which supports career development experiences for individuals interested in research in areas that don’t involve human subjects, or the Mentored Patient-Oriented Research Career Development Award (K23) if they plan a career that does include clinical research.

K08: Mentored Clinical Scientist Development Award

Purpose

The K08 aims to provide the opportunity for promising medical scientists with demonstrated aptitude to develop into independent investigators. This mechanism provides specialized study for individuals committed to a career in laboratory or field-based research.

Eligibility

The candidate must have a clinical doctorate or its equivalent or a PhD in a clinical discipline. The candidate must be willing to spend a minimum of 75% of his or her full-time professional effort conducting research and research career development for the period of the award, which may be 3, 4, or 5 years, and to identify a mentor with extensive research experience. Former principal investigators of NIH small grants (R03) or exploratory/development grants (R21) are eligible, but former principal investigators on an NIH research project (R01), subprojects of the program project (P01) or center grants (P50), or the equivalent are not eligible.

K23: Mentored Patient-Oriented Research Career Development Award

Purpose

The K23 aims to provide support for the career development of investigators who have made a commitment to focus their research endeavors on patient-oriented research. This mechanism provides support for a 3- to 5-year period of supervised study and research for clinically trained professionals who have the potential to develop into productive clinical investigators.

Eligibility

The candidate must have a clinical doctoral degree or its equivalent, or a PhD in a clinical discipline. Candidates must have completed their clinical training, including their specialty, before receiving the award. They must be willing to spend a minimum of 75% of their full-time professional effort conducting research and research career development for the period of the award, which may be 3, 4, or 5 years, and must identify a mentor with extensive research experience. Former principal investigators of NIH small grants (R03) or exploratory/development grants (R21) are eligible, but former principal investigators on an NIH research project (R01), subprojects of the program project (P01), or center grants (P50), or the equivalent are not eligible.

The grant application for K08 and K23 awards includes two major components: the Research Plan and the Career Development Plan.

In the Research Plan, the primary investigator should

- Describe how the research, coupled with other developmental activities, will provide the experience he or she needs to launch and conduct an independent career
- Describe how the research relates to his or her goals and aspirations
- Include a specific hypothesis, a list of the specific aims and objectives that will be used to examine the hypothesis, a description of the methods/approaches/techniques to be used for each aim, a discussion of possible problems and how they will be avoided, and,
when appropriate, alternative approaches that might be tried if the initial approaches do not work.

In the Career Development Plan, the primary investigator should

- Describe the new enhanced research skills that he or she intends to acquire
- Explain his or her potential to enhance his or her research career
- Specify the structured activities he or she will undertake such as course work, technique workshops, seminars, scientific meetings, journal clubs, training in the responsible performance of research, presentation skills, and a grant-writing course
- Estimate the percentage of time involvement for each activity
- Describe the opportunities for intellectual interactions with other investigators including mentors, co-mentors, consultants, and collaborators
- Evaluate expectations for publications over the entire period of the proposed project
- Describe facilities, technical support, equipment, and other resources available for career enhancement activities as well as the research proposed
- Include clear commitments from mentor(s) and the department chair
- Obtain departmental and institutional assurances that he or she will be released for time required for the research career development plan with institutional support to achieve the stated goals
- Describe the investigator teaching load for the period of the award (number and types of courses or seminars)
- Describe his or her current and future clinical responsibilities
- Describe his or her current and future committee and administrative assignments.

The grant review process

Alfonso Torquati

text: alfonso.torquati@duke.edu

The peer review process is central to the scientific community’s effort to fund the best possible research. Because the funding agency usually receives significantly more applications for funding than they can afford to support, they must use some means of determining which applications should receive priority for funding.

The grant review process involves multiple steps. First, an initial screening of an application is conducted to ensure that it provides adequate information and complies with the requirements set forth in the agency’s funding opportunity announcement. After the initial screening is complete, the application is submitted to an ad hoc independent panel of peers or experts, a standing review committee, or a group of field readers for review in accordance with the evaluation criteria included in the funding opportunity announcement. One of the reviewer’s duties is to acknowledge any conflicts of interest to ensure fairness in the grant review process. Panelists must declare such conflicts before any discussion. Declaring a conflict of interest does not mean that a panelist cannot serve. It merely means that the panelist may not discuss or vote on applications for which a conflict exists.

Grant review committee meetings are held periodically to review the applications received in response to standing deadlines for investigator-initiated research projects or ad hoc when the agency issues a request for application (RFP). In general, each proposal is assigned to three reviewers. The panelists can serve as primary or secondary reviewers or as readers of a grant. Reviewers are asked to prepare written critiques before the grant review meeting convenes.

Reviewers assess the feasibility, novelty, and potential value of the proposed project, as well as the qualifications of the scientist, the suitability of the facilities available for the work, and the appropriateness of the budget. After considering all of these factors, each reviewer assigns each grant a single score. Just as the applicants must follow a carefully detailed process in presenting their arguments, so the reviewers must follow a carefully prescribed set of criteria for judging the merits of the applications. The review criteria and a few of the key questions reviewers ask are presented in the following sections.

Aims, hypothesis, and methods

- To what degree are the questions to be answered and/or the hypotheses to be tested well conceived, clearly stated, and scientifically plausible?
- To what extent do the hypotheses reflect a familiarity with the historical background of the problem, an awareness of similar projects that have been undertaken previously, and an adequate knowledge of related activities in the field and the pertinent literature?
- How feasible is the proposed investigation?

Significance

- How necessary is the proposed investigation to the development of new knowledge in this research area?
- How novel is the project? How will the expected results from this investigation make a clear and significant contribution to the field?
Investigators and institutions

- How extensive is the principal investigator’s history of professional experience in this research area?
- Have the investigators clearly demonstrated competence for conducting work in this area?
- How favorable is the institutional setting?
- How suitable and sufficient is the equipment to be used?

Budget

- Is the budget appropriate to accomplish the proposed work?

At the committee meeting, each application is considered in turn. The primary reviewer summarizes the proposal to the other members of the panel and discusses the application’s strengths and weaknesses. Next, the secondary reviewer and the reader add further critiques about the scientific value of the grant. After discussion among the reviewers and the remainder of the panel for that particular application, a final vote is taken. When the votes are averaged after the meeting, they constitute the final assessment of the proposal. The applications are ranked in priority score order, and the agency funds as many of the meritorious applications as the budget permits.

Conflicts of Interest and Ethics: Issues in Research Funding

Piero Marco Fisichella, Richard L. Gamelli

Loyola University Medical Center, Department of Surgery, Stritch School of Medicine, 2160 South First Avenue, Room 3226, Maywood, IL 60153, USA

Presented at the Society of American Gastrointestinal Endoscopic Surgeons (SAGES) Research Committee, Career Development Workshop, Chicago, IL, 1–2 August 2008

Correspondence to: Piero M. Fisichella
Phone: (708) 327-2236
Fax: (708) 327-3492

Abstract In the past 20 years, the prevalence of commercial financial interest in biomedical research has increased consistently, and industry currently is the principal sponsor of biomedical research in the United States. This widespread partnership between the biomedical industry and academic institutions has boosted progress with new technical advances and breakthrough discoveries. It has also created an environment prone to generate conflicts of interest. Awareness of these issues must encourage young researchers to promote and continue valid and unbiased research by focusing on important ethical principles.

“Integrity without knowledge is weak and useless, and knowledge without integrity is dangerous and dreadful” (Samuel Johnson, 1709–1784).

Research is a privilege. The researcher must earn this privilege by conducting his research in an unbiased manner, with honesty, and following the ethical principles of respect, beneficence, and justice when dealing with human research subjects [1]. In addition, the researcher’s honesty gives trust and credibility to the research process. Conflicts of interest and other ethical issues in research, however, are present everywhere and can subtly challenge the researcher’s integrity and dangerously weaken his credibility in the eyes of the patients, the public, and the whole scientific community.

Conflicts of interest are “a set of conditions in which professional judgment concerning a primary interest (such as a patient’s welfare or the validity of research) tends to be unduly influenced by a secondary interest (such as financial gain)” [2]. These secondary interests are not only financial. They also can result from the need for personal or academic prestige. These all are equally dangerous, but unlike the other forms of interests, financial interests are non-obligatory and seductive, arising from the widespread relationships between the industry and academic institutions [2].

The financial relationship between industry and academic institutions has increased consistently over the past 20 years. A comprehensive study analyzing the sources of funds for biomedical research showed that in 2003, industry was the principal sponsor of biomedical research in the United States [3]. Industry funded 57% of the research, whereas the National Institutes of Health (NIH) funded 28% [3]. In addition, funding of clinical trials by industry increased from $4 to $14.2 billion in 2003 [3].

As a result of this increased financial support from industry, the relationships among industry, researchers, and academic institutions flourished. In their systematic review, Bekelman et al. [4] showed that approximately one-fourth of investigators have industry affiliations, and roughly two-thirds of academic institutions hold equity in start-up companies that fund research conducted at the same institutions. In addition, a web of financial relationships exists at a certain point between federal institutions, such as the NIH, and industries. For example, in 1995, the NIH supported the financial relationships of its senior members with the industry. To attract accomplished scientists, the NIH allowed some of its members to supplement their
young researchers if current NIH funding trends continue [7]. Using data from the NIH, the report describes a grim environment. The overall success rate for the R01 grants, or their equivalents, decreased from 32% in 1999 to 24% in 2007. The success rate for applications at their first submission dropped from 29% in 1999 to 12% in 2007, and the success rate for the R01 grants is only 18% for first-time applicants [7]. This could stimulate additional researchers to seek a more gratifying financial relationship with private industry.

This financial relationship of the researcher looking for financial support and industry can take many forms. The researcher can hold a salaried position in an industry, work as an ad hoc consultant, receive honoraria, receive financial provision for his research, or possess equity interests including stock options and royalty income. In general, these relationships do not involve any ethical risk or bias as long as they don’t influence the researcher’s judgment [2]. However, the difficulty estimating the influence of these relationships on the researcher’s judgment and the need to prevent the public misperception that the researcher’s judgment has been biased has led to the establishment of rules or guidelines that help regulate conflicts of interest [2]. These rules regulate stock possession, compensation, and financial disclosure. They have been implemented by Public Health Service agencies such as the NIH, the Centers of Disease Control, the Food and Drug Administration, and professional associations such as the American Medical Association and the American College of Physicians to prevent the researcher from finding himself in an unethical situation [8–11].

Yet, although free of secondary interests, a researcher may be accused of a conflict of interest by not taking reasonable precautions to avoid a potential unethical situation or by not observing rules regulating conflicts of interest [2]. In addition, rules regulating conflicts of interests were developed to minimize or reduce conflicts of interest in biomedical research with the goal that this would avoid any bias in the research process. Interestingly, Bekelman et al. [4], assessing the relation between industry sponsorship and outcome in research, showed a statistically significant association between industry sponsorship and conclusions that favored industry-sponsored research [4].

Other issues specific to research funding also may introduce significant bias into the research process. These issues arise from the explicit interest of the industry in marketing the results of research and can threaten the researcher’s independence in designing, conducting, and interpreting his research. For instance, industry can support studies with a specific methodologic design or can influence the interpretation of studies favoring a specific treatment, a particular drug, or a novel device. Alternatively, by contractual agreement, the industry can influence the researcher in data handling and reporting.

Bekelman et al. [4] showed that industry sponsorship is associated with restrictions on publications and data sharing [4]. The researcher also may be excluded from the trial design, may have limited or no access to the raw data, may have minimal responsibility in the interpretation of the results, and may be required to publish only positive results [4, 12]. All this endangers the academic freedom of the researcher and also introduces a publication bias. The researcher has the ethical obligation to report both positive and negative results and must be clearly responsible and accountable for his or her work.

The solutions adopted by the scientific community to minimize conflicts of interest and other ethical issues specific to research funding are many, but disclosure is
undoubtedly the most common practice [2, 8–12]. Other solutions applied by professional or governmental agencies when more serious yet uncommon situations occur are mediation (e.g., the researcher sets up a trust in which he or she has no control over the financial transactions), abstention (e.g., the researcher disqualifies himself from the voting procedure in committees), divestiture (e.g., the researcher is required to return the financial gain, such as stocks), and prohibition (e.g., the researcher is banned from practice) [2].

Disclosure protects the independence of the researcher from the influence of the funding industry and promotes his responsibility and accountability [12]. The International Committee of Medical Journal Editors (ICMJE) encourages researchers to use Uniform Requirements for Manuscripts Submitted to Medical Journals: Writing and Editing for Biomedical Publication to protect themselves from potential issues [13]. This document, developed to help the researcher negotiate research contracts with sponsors, requires the authors of a manuscript submitted for publication to disclose the details of the author’s and sponsor’s role in the study and to sign a statement in which they accept fully responsibility for the performance of the trial, declaring that they have access to the data and that they participated in the interpretation of the results [13]. In addition, before consideration for publication, researchers are required to register their clinical trial into a public registry in which the funding source and the primary and secondary sponsors are clearly disclosed [13].

Disclosure of conflicts of interest has three goals: to enhance public trust and provide research subjects with information necessary for giving an informed consent, to comply with regulatory requirements and protect against legal threats, and to deter researchers and institutions from having conflicts of interest [14]. Disclosure, however, does not always achieve these goals. For instance, disclosure does not always deter researchers and institutions from having conflicts of interest. As an example, the less stringent NIH conflicts of interest rules of 1995 did not prevent several NIH scientists from involvement in serious financial conflicts of interest in 2003, regardless of the strict disclosure policy implemented to avoid such problems [5]. Furthermore, disclosure seems to enhance transparency only to protect the institution from legal threats and not to benefit research subjects in their right to give an informed consent [14]. Finally, too much focus on the need to disclose conflicts of interest can divert the public opinion and the scientific community away from the scientific validity of the research [2, 12]. Introduced to provide trust and credibility to the research process, disclosure can mislead the public and the patients by bringing doubts and distrust.

Although disclosure is not the solution to all problems, it is essential when research is performed with human subjects. Policies supporting disclosure of financial conflict of interest to research subjects have been developed by the American Association of Medical Colleges (AAMC) and the United States Department of Health and Human Subjects (DHHS) [8–11, 15].

The 2001 report of the AAMC task force on Financial Conflicts of Interest in Clinical Research offers guidance to institutions in their efforts to provide responsible and effective oversight of financial interests in human subjects research by suggesting that a Conflicts of Interest Committee (COIC) be established that would report any conflict of interest to institutional review boards (IRBs) [15]. This report also recommends written disclosure in the consent form of any significant financial interest held by the researcher conducting the research with human subjects. The precise wording of disclosure in the consent form should be determined by the IRB, should explain that the COIC has reviewed the financial interest, and should state that both the COIC and the IRB have determined that the conflict of interest doesn't pose any significant risk to the welfare of research subjects or the integrity of the research [15].

The 2004 Financial Relationships and Interests in Research Involving Human Subjects: Guidance for Human Subject Protection published by the DHHS acknowledges that financial interests may turn into conflicts of interest that would affect the rights and welfare of human subjects in research and suggests actions that IRBs, institutions, and investigators need to consider regarding financial interests [9]. These actions include written disclosure in the informed consent of “the source of funding and funding arrangements for the conduct and review of research, or information about a financial arrangement of an institution or an investigator and how it is being managed; having a another individual who does not have a potential or actual conflict of interest involved in the consent process, especially when a potential or actual conflict of interest could influence the tone, presentation, or type of information presented during the consent process; and using independent monitoring of the research” [9].

A survey of IRBs, COICs, and investigators designed to assess the successes and limitations of disclosure as a management strategy for conflicts of interest in research showed a struggle among chairs of IRBs, COICs, and researchers in implementing such a policy [16]. This struggle focuses primarily on what to disclose, the amount of interest to disclose, and the reason to disclose a financial relationship when it likely does not affect the decision making. However, Weinfurt et al. [16], citing the work of Faden and Beuchamp [17], suggest that what influences the
decision making is the value that subjects, not the investigator, place on having the information in question.

More recently, the AAMC guidelines issued in 2001 and 2002 have been reinforced in response to the results of a survey by Ehringhaus et al. [18], who showed that that as of 2006, only 38% of the medical schools surveyed had policies addressing institutional conflicts of interest. This study urged the AAMC and the Association of American Universities (AAU) to issue another report in February 2008 that underscores the urgent necessity for all academic medical centers to address conflicts of interest consistently and to ensure that all faculty, officials, and institutions are subjected to a thorough reporting and disclosure [19]. This report makes several recommendations to accelerate implementation of effective policies that address both individual and institutional financial conflicts of interest. It offers a model template and 10 detailed case studies for analyzing and managing conflicts of interest [19].

In summary, research is a privilege that invests researchers and institutions with the ethical responsibilities of avoiding conflicts of interest [18]. These ethical responsibilities should be divided among the researchers and the institutions, although it is difficult for institutions tied financially to industry to regulate themselves despite the presence of internal and external monitoring that should safeguard against institutional conflicts of interest [4, 18]. Furthermore, academia–industry relationships are beneficial and fundamental for the progress of science provided that conflicts of interest are handled well, recognizing that disclosure is a good practice, yet imperfect. However, in the end, the greatest responsibility lies with the researcher, who has the moral and now the legal obligation to disclose his or her relationships and their extent to the public, the patients, and the scientific community, as well as the responsibility to maintain his or her research integrity by avoiding dual commitments in order to promote and continue valid and unbiased research.

References


Manuscript preparation and review: constructing a scientific manuscript

Atul K. Madan

Los Angeles, CA

Presented at the first annual Society of American Gastrointestinal Endoscopic Surgeons (SAGES) Career Development Workshop, Chicago, IL, 2008

Correspondence to: Atul K. Madan
email: atulkmadan@yahoo.com

Writing a manuscript can be a daunting task for even the most seasoned surgeon. It often is perceived as an intimidating, tedious, arduous, time-consuming, and even boring process. Other papers on the process of writing a scientific manuscript have been published [1–17]. All of them have excellent hints and tips on the best way to write an article. Unfortunately, these are only guidelines. There are no tricks or secrets to writing a manuscript. Every well-published surgeon develops his or her own technique. However, for the novice researcher, it is imperative to understand the important steps from completing a project to writing the paper.

Publishing is an important part of any academic physician’s career. Without the publishing of a paper, no knowledge is disseminated, and work in a given field may be repeated. For selfish reasons, finishing a set of experiments with a formal publication robs you of a chance to demonstrate your expertise, to market yourself to others in your field, to get your name out, to demonstrate to your institution that your work is considered valuable, and to add something to your curriculum vitae. “Publish or perish!” may be a cliche, but it is still true.

Many smart surgeons fail to write for fear of writing. After spending more than a decade training in medicine, we are much more comfortable at wielding a knife than wielding a pen or, in the computer age, we are much better at typing orders than at typing a manuscript. This fear is conquered only by writing and continuing to write. In addition, reading journals will help you understand the language and prose of scientific writing. Some of the most prolific writers also are the most well read.

For those who do not possess natural literary skills, writing is the first thing procrastinated. Although it is impossible that reading this article will cure the procrastination plague of most busy academic surgeons, hopefully it will help break down the steps to constructing an organized, well-thought-out, and well-written manuscript. It is easier to write a small section than a formal full-length article. The mnemonic IMRAD (introduction, methods, results, and discussion) [2, 15–18] is helpful, but it is only a piece of the puzzle that makes up a well-constructed academic article. This article aims to enable the novice reader to understand the various elements required for the development and construction of a publishable scientific manuscript.

Before you write

When you approach the construction of a manuscript, a few items are required even before you start to write. These prerequisites are listed in Table 1. You should be reviewing some of these in your mind even before you start your project.

<table>
<thead>
<tr>
<th>Table 1 Before You Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What type of manuscript are you writing?</td>
</tr>
<tr>
<td>2. Is the project finished?</td>
</tr>
<tr>
<td>3. Did you perform the appropriate statistical analysis?</td>
</tr>
<tr>
<td>4. Who is your audience?</td>
</tr>
<tr>
<td>5. Do you have all the necessary references and literature?</td>
</tr>
<tr>
<td>6. Are your findings novel and interesting?</td>
</tr>
</tbody>
</table>
What type of manuscript are you writing?

Various types of manuscripts exist. The type corresponds to the type of study you are performing. A retrospective case series is different from a randomized controlled trial. The structure of a case report does not require a Results section but does require a more detailed section of the case being reported.

Is the project finished?

Although it is always a good idea to start writing before you finish your project, it is premature and impossible to complete your manuscript before you complete your experiments. If you are still waiting on experiments, you should not start assuming the results. Such assumption is a slippery slope that may lead to ethical issues when you report your data.

Did you perform the appropriate statistical analysis?

One of the most frustrating issues a novice scientist can encounter is to complete a manuscript and submit it to a journal only to be told that his or her statistical analysis is incorrect. Your discussion may be incorrect if you are not sure what your results mean. In addition, further experiments may be required if a trend is seen but one without statistical significance.

Who is your audience?

This also can be asked as “where do you want to send your work?” The chosen journal is important because each journal has its own set of rules and subtle nuances. In the digital world, most of the Instructions for Authors are available online. A good resource is http://mulford.meduohio.edu/instr/. This resource, with links to more than 3,500 journals in the health and life sciences, is available free via the Internet from the University of Toledo Health Science. You can search by keyword or title. If your intended journal is not there, an Internet search should show the publisher site.

The second option is to look at the print copy of the journal itself. You need to follow the rules of your chosen journal carefully, or your manuscript may be returned without ever getting reviewed. In addition, every journal has an impact factor that usually correlates with the strength of the journal. For the novice academician, knowledge of the journal’s strength will help to determine whether the work is appropriate for the journal.

In addition, the manuscript should be tailored for the intended readers. For example, a bariatric surgery manuscript for Lancet will require a different introduction section than one for Obesity Surgery. The readership of Lancet may not understand the technical aspects of a Roux-en-Y gastric bypass compared with the readership of Obesity Surgery. It is essential to peruse prior articles to get an idea of the style and types of articles that have been published in the past.

Do you have all the necessary references to the literature?

You must have the important literature referenced in your manuscript, for three main reasons. First, to write a proper discussion, you need to discuss the relevant papers that have been written about the topic. Second, you do not want to write a paper that demonstrates results similar to those reported in other papers without mentioning how your data are unique. Third, most journals solicit experts in the particular topic of a submitted manuscript. If the expert reviewer does not see his or her paper referenced, a conscious or subconscious bias against your paper may be the result.

Review the literature and take notes (i.e., highlight, mark with a pen, or write on another sheet of paper). These notes will help you develop the Introduction and Discussion sections.

Are your findings novel and interesting?

You need to take an honest look at the data to determine whether they are truly novel and interesting. It is rare for one to design and execute a study in which the data are completely similar to those of another study. If you find that your study is similar to other studies, one of two things has occurred. You either did no perform an appropriate literature search before designing the study, or you have been unlucky. Another group was working on the same study and published their data first. If you are in this rare happenstance, do not despair. Many repetitive studies have been published. Some of them have even had a worse design than their predecessors. These studies were published in lower-impact journals. However, these original studies need to be referenced in the Discussion section.

Title page

The title page often is an afterthought for novice writers. This is understandable because most of the items on the title page are known, namely, Authors, Affiliations, and Corresponding Author. Depending on the style of the journal, Keywords, Acknowledgments, Place Where the Work Was Presented, and Word Count may be required as well. Keywords should be chosen carefully because they will be used to help index your article.
The Acknowledgments section is an important section as well. Individuals who assisted with the work but did not participate enough to be considered authors should be acknowledged. An example would be a surgeon whose patients were included in the study but who did not participate in the study design or in the manuscript preparation. Another example would be the PhD scientist who created the enzyme needed for your experiment. Such kudos are important in building the proper relationships between you and your colleagues. Funding sources should be mentioned as well.

Deciding on who should be considered an author once was determined at the whim of the first or senior author. Currently, established guidelines exist, and some journals require you to document what each author did. Not everyone will contribute equally, but the individual’s contribution must be significant enough to warrant his or her placement as an author. Ideally, the order of the authors should be obvious, but realistically, it never is. As a rule, the first author is the person who did the majority of the work and wrote a majority of the paper. The last author often is the corresponding author who was overseeing the study and finalizing the manuscript. In general, the second and third authors are considered important positions because some journals list only the first three authors in their reference list when the report has more than six authors.

Many personal and professional friendships have been soured over the order of authorship. Because most studies and papers are not written in a vacuum, it is important to recognize the possibility that two people worked on a paper almost equally. I personally recommend that the authorship be discussed before a study is initiated. In general, an inclusive rather than an exclusive approach helps with collegiality and team building. Allowing a more junior physician (who performed an equal portion of the work) to be listed as a first author while you take the senior author position will win you a friend and allow readers to see you as a more senior investigator. Ethically and morally, authorship order should represent the true work that was done and not a compensation or a reward.

The most important part of the title page is the title. The title and running head should be descriptive but concise. Each journal has a limit for the number of characters or words that must be honored. The title can be a statement or a question. Titles can be catchy but should not be trite. If it is too catchy, the reviewers may be disappointed or frankly annoyed. Your title should catch the reader’s interest. Words such as “prospective” and “randomized” help to distinguish your paper from the others. Some questionable titles that I personally have used include “Does pouch size matter?” and “Drugs, guns, and kids: the association between substance use and injury caused by interpersonal violence.” Some more appropriate titles that I personally have used include “Predictive value of upper gastrointestinal studies versus clinical signs for gastrointestinal leaks after laparoscopic gastric bypass,” “Prospective randomized controlled trial of laparoscopic trainers for basic laparoscopic skills acquisition,” and “A prospective randomized trial of laparoscopic polytetrafluoroethylene (PTFE) patch repair versus simple cruroplasty for large hiatal hernia.” The following titles are listed in order of increasing appropriateness:

- The end of open gastric bypass
- Which is better, laparoscopic or open gastric bypass?
- Laparoscopic gastric bypass demonstrates improved results over open gastric bypass
- Prospective randomized controlled trial of laparoscopic versus open gastric bypass

The Abstract The section that works best as the first section often is debated. Some authors suggest starting with the Results section [5]. However, many surgical manuscripts are written after they have been presented or accepted as abstracts. Even prolific academic surgeons rarely write the manuscript before the abstract deadline. In fact, many papers are written, including this one, right before the manuscript due date. For the purpose of this discussion, we assume that the manuscript is being produced de novo without the acceptance of a prior abstract. Even if you have an accepted abstract, cutting and pasting the same abstract should never be done. You may have added more data. More importantly, you should take advantage of the opportunity to refine and edit your abstract.

Most journals require a structured abstract. The structure of the abstract varies, so it is important to read the Instructions to Authors carefully. Most publications require the abstract to be less than 250 words. The basic structure of an abstract follows the outline of your manuscript, with Background, Methods, Results, and Conclusions. Remember your abstract is the main and often the only section read by most of your audience. You are trying to advertise for them to read the whole paper without overselling.

The Background section should be three to four sentences leading to why you did your study. The last sentence should always state your aim, goal, or hypothesis.

The Methods section should describe concisely the type of study design you used, your participants, the intervention, and the outcomes measure. It tells how you did your study. Specific details of assays or the procedures performed are not needed. A simple statement of the statistical
tests used can be helpful as the last sentence. However, if you are running out of room, this may be deleted.

The Results section should report the most important data in case the reader chooses to read only the abstract. It tells what you found. The sample size can be given in parenthesis to save space. The inclusion of \( p \) values always strengthens the Results section. Concluding sentences are not appropriate for this section.

The Conclusions section should be only three to four sentences. It provides meaning to what was found. It should be directly related to the hypothesis and the data. A common mistake is to overstate the results.

Once the abstract is written, I recommend typing out the titles Introduction, Methods, Results, and Discussion on separate pages. You can cut and paste the corresponding abstract section to the pages. Now, you have five pages already written. Expand on each section in whatever order you wish. If you get stuck or experience “writer’s block,” move to a different section.

The Introduction section

Like the Background section of the abstract, this is the “why” of your paper. Why did you really do this study? You are setting the stage for the purpose of doing the study. The Introduction section usually is about three to four paragraphs [2, 19]. The first paragraph can discuss the problem in a general sense. This is where your audience is important. There is no need to discuss the multiple medical comorbidities that occur with obesity for a full paragraph in a study on the effect of limb length on a Roux-en-Y gastric bypass in a paper to Surgery for Obesity and Related Diseases (SOARD). The readership of SOARD already understands that, and it does not add anything to your paper.

The next paragraph should give some more specific information about the topic you have studied. It is further proof that your study needed to be performed. The final paragraph should end with a statement that describes the hypothesis ideally. Although most scientific research should be hypothesis based, not all manuscripts are. In these rare cases, the objective, goal, or aim of the study should be stated. The hypothesis should not be implied but stated clearly. The following is a good example: “The hypothesis of this study was that authors who act coy when stating their hypothesis are less likely to get promoted to the rank of full professor.”

Your introduction is not a review of all the literature on the topic. In general, it is wise to save most of the references for the Discussion section. It takes time and practice to sift between which references are better discussed in the introduction than in the discussion. When in doubt, leave the reference for the Discussion section. A general rule is that three paragraphs are enough and six paragraphs are too many.

The Methods section

Some consider the Methods section to be one of the most important parts of a scientific manuscript [8]. This section often is the easiest to start writing, especially if you have obtained approval from your Institutional Review Board (IRB) or Animal Care Committee. Most of these committees require a relatively full description of your study design. The design often can be pasted directly in the manuscript for appropriate editing. A statement of all IRB approvals currently is a standard requirement for many journals. Initiating the Methods section with this statement will make it clear that you have an understanding of the research process with the reviewer. If a consent process was involved for this research, this should be mentioned as well.

You need to be specific about the study design. Depending on your study, a flow chart or diagram may be helpful in depicting the overall study design. The CONSORT is a great reference on how to describe a randomized clinical trial [20]. It also can be a great aid for the Methods section of other studies as well [2]. Key descriptive terms that should be included when appropriate are “retrospective,” “prospective,” “case-controlled,” “nonrandomized,” “randomized,” and “case series.” The actual participants, subjects, or animal models used should be well defined. For clinical research, exclusion and inclusion criteria should be explicit. The research setting should be described for clinical studies as well. The interventions should be detailed as well as the outcomes measured.

Any procedures or experiments need to be written as a recipe [3]. Anybody well versed in the field of the study should be able to perform the procedures or experiments with only this description. When appropriate, the manufacturer and model (with city and state) of instruments, assays, and enzymes should be given.

Finally, a data analysis plan should be given. It is important to discuss the statistical test or tests. The level of significance should be noted (e.g., “A \( p \) value less than 0.05 was considered statistically significant”). If a power analysis was performed, it should be noted. A strong data analysis is important, and the advice of a statistician may be useful. You need to be prepared for the reviewer to ask about parametric versus nonparametric tests. Post hoc tests may be needed as well. A univariate analysis is much weaker than a multivariate analysis.

Novice writers often try to add some results in this section and to describe their methods in the next section. It is important to divulge only “how” you did the study in
this section. The next section is to tell everyone “what” you found.

The Results section

Some have described the Results section as the most important part of the manuscript [5]. Again, this is “what” you found and should include only your data. It is important to give \( p \) values even if they are not significant. Negative results should be reported as well. Although the literature has a bias for positive results, a well-designed study that has appropriate power with negative results can and should be published.

The actual reported data depend on the type of study performed. In studies involving human subjects, demographic data should be given, often presented as a table. Before delving into subgroup analysis, it is essential to report the data for the general population. It is important to report the sample size in the Results section as well.

The yearning to interpret the data in the results section should be avoided. This section should be about the facts (i.e., numbers, graphs, and tables). Descriptive data are appropriate, but interpretation is not.

Tables and figures often are referred to in the Results section. It is important that these tables and figures be additive to the text of the section and not repetitive. Some studies may produce massive amounts of data. It is a lofty goal to include every single piece of the data. When you encounter too much data, you have to decide which data points are necessary and which are dispensable. Tables often are a good method for including more data without disrupting the flow of your manuscript. It allows for the concise display or summary of multiple data points. When possible, \( p \) values should be included in the tables.

Figures should be properly constructed with the appropriate program. They need to be visually appealing and should provide a concise display of your data. For example, bar graphs are useful for comparing multiple variables between two groups. A circle graph is helpful in describing percentages. Font size, legends, error bars, color versus shading, and titles all should be taken into consideration. Because figures usually are reduced, a small font size on a full sheet of paper may be illegible when it appears in print. Again, \( p \) values are needed either in the figure itself or in the figure legend. Operative photographs should be of high quality and converted to the required electronic format according the Instructions for Authors. Many journals charge for color pictures, so be aware of these potential costs if your pictures do not produce well in black and white. Adding arrows, asterisks, or letters to clarify structures in a photograph may help to orient the reader.

Figure headings are just as important as the figures. They need to be concise descriptors of the figure. Any arrows, asterisks, markings, or abbreviations need to be included. For figures referred to in the Results section, there is not need for interpretation of the data.

If you are using tables or figures, ask yourself if you really need them. Many times the answer is no. If you doubt their utility, so will most reviewers.

The Discussion section

The Discussion section allows for interpretation of the results. Its main purpose is the explain the meaning of your data [7]. Now is your time to answer the implied question by the reader: “So what?” To start the discussion, it is always best to summarize the data in the first paragraph [9]. The next paragraphs should compare your study with the published literature. You want to show why your study is novel and interesting. When referencing other papers, you will want to make sure that you concisely describe the findings that relate to your study. A one paragraph synopsis for each of your 10 references will become tedious to read and most likely will result in a recommendation for a major revision by the reviewers. Brevity is key.

Here is the place where you tell the reader why your paper is so important. It is important not to overstate your results. For example, if you found that laparoscopic gastric bypass patients had a shorter hospital stay than open surgery patients, do not conclude that the laparoscopic gastric bypass is a safer procedure than the open gastric bypass. Inflating your results will deflate the chance of your paper’s acceptance. More importantly, even if it is accepted, the readers will not take your paper (and eventually you) seriously.

Every good Discussion section has one or two paragraphs that consider alternative interpretations. Admitting that your data could mean something other than your hypothesis does not make you a bad researcher. At times, this section can be combined with a Limitations section or lead into it. There is no study without limitations. You should look at your data with an unbiased eye. Again, remember that no study is perfect. Your inclusion and exclusion criteria may prohibit the generalizability of your results to the whole population with the disease investigated by your study. There may be better but less practical methods for outcome measures. Subgroup analysis may suffer from limited sample size. Retrospective studies are limited by their very nature. An association does not prove cause or effect. Confounding factors can always occur. The bias of a practitioner, researcher, or patient could have been introduced.

On the other hand, the Limitations section is not the place for self-deprecation. For example, while writing the manuscript of a paper on a study that reported a larger sample size than any previous article on the topic, my
colleague suggested that we describe our sample size as “small.” We compromised and said the sample was “relatively small.” One of the reviewers actually asked us to take the statement out because the study was the largest at that time.

The second to the last paragraph should describe what needs to be done to continue the reported line of research. Some authors have suggested never using the phrase “further study is required” [2] although at times it may be appropriate. Another option would be to state that you are starting the next line of work currently. For example, if you have retrospective data demonstrating that one technique may be superior to another, you may state that you are in the process of enrolling patients for a prospective study. Of course, this would be appropriate only if it is true.

The final paragraph is the conclusion. This is the place where the hypothesis needs to be considered. It should tie the hypothesis in with the data. Did you prove the hypothesis? Did you refute the hypothesis? What is the “take home message” [2]?

Now that you think you are finished writing

Once you have finished the aforementioned sections, you can indulge a sigh of relief thinking you are finished. But now comes the important part, the final details. You need to add the references. Investing in a reference manager program will make life easier. You also have to edit and then edit and edit again. You should even edit and check your references because it is embarrassing to misspell a potential reviewer’s name. It is rare that one of my papers does not get edited at least four times. In addition, all authors who presumably were helping with the construction of the manuscript should proofread the manuscript as well. When multiple authors are reviewing the paper, the Track Change mode in most word processors should be used. This mode will save time and allow multiple authors to review the paper simultaneously then send it back to the main author.

Editing is just as important as writing. Some of the best editors are the worst writers and vice versa. You have to do both to publish. Use your mentors and others not involved in the study for their input and editing skills. Table 2 has some tips on what to look for when editing. These are common mistakes that I have seen reviewing papers for myself, coauthors, colleagues, and journals. Make sure that you have not included incorrect items in the wrong section (i.e., data not mentioned in the Results section but discussed in the Discussion section or data mentioned in the Methods section). Focus on the grammar, syntax, and flow (ref G) [14]. The data (the numbers and \( p \) values) need to be checked [14].

Review the Instructions for Authors again to make sure that all the instructions have been followed [14]. Also, it never is a bad idea to do a last minute literature search before sending your manuscript, especially if finalizing your manuscript occurs months since your last literature search.

Other helpful hints

Writing a scientific paper is not similar to writing a non-fiction book, a newspaper article, or an editorial. The style is more cut and dried. Clever remarks may not be appreciated by the editor or the reviewer. Without a doubt, however, experience in any type of writing will help you be able to write better. Most surgeons write every day. Operative reports, discharge summaries, and consultations are a few examples of the volumes of “writing” you do every day. It is easy to be intimidated when you write your first scientific manuscript, but it also is very rewarding to open up the journal with your first scientific manuscript finally published.

This chapter is a guide showing how to construct a scientific manuscript. It is by no means complete or a description of the only way to write. I have personally ignored many of my suggestions when the type of manuscript and flow of the paper required that I do so. For those who are serious about learning to write scientific manuscripts, I suggest reading the references for this chapter. Although some of the information may be repetitive, many

<table>
<thead>
<tr>
<th>Table 2 Editing Tips</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Commas</strong></td>
</tr>
<tr>
<td><strong>Misspelled Words</strong></td>
</tr>
<tr>
<td><strong>“Data”</strong></td>
</tr>
<tr>
<td><strong>Run-on Sentences</strong></td>
</tr>
<tr>
<td><strong>Transitions</strong></td>
</tr>
<tr>
<td><strong>Adjectives/Adverbs</strong></td>
</tr>
<tr>
<td><strong>Repetition</strong></td>
</tr>
<tr>
<td><strong>Jargon</strong></td>
</tr>
<tr>
<td><strong>Numbers</strong></td>
</tr>
</tbody>
</table>

Surg Endosc
of the quoted articles will be helpful for increasing your comfort and skill levels. An article by Provenzale [1] describes 10 principles that help to improve the acceptance of a scientific manuscript. These points are described in Table 3. Thompson [4] published a similar article that gives 12 simple but effective tips for writing a journal article. These are summarized in Table 4. Finally, the Division of Laparoendoscopic and Bariatric Surgery at the University of Miami Miller School of Medicine has developed a list of tips for research and publishing. The Appendix presents the tips specifically related to writing.

Conclusion

Constructing a scientific article may seem demanding. It is, however, not only rewarding but also a requirement for a successful academic career. In the beginning, the process may seem overwhelming. Breaking down the manuscript into its parts makes it a less formidable foe to conquer. As you develop from a novice writer to a more experienced writer, manuscript preparation becomes less of an enigma and more of a simple but important process.

References

6. Pierson DJ (2004) The top 10 reasons why manuscripts are not accepted for publication. Respir Care 49:1246

Table 3 Ten Principles to Help Get a Manuscript Accepted
1. Organization of Manuscript
2. Study Question/Rationale Clearly Stated
3. Materials and Methods Systematically Explained
4. Materials and Methods Section and Results Section Should Have Similar Structure
5. Concise Discussion
6. Explain Why Your Results are Important
7. No Overinterpretation of Data
8. State Limitations
9. Interpret Unexpected Results
10. Follow Reviewer’s Suggestions In the Revised Manuscript

Table 4 Twelve Tips To Write a Successful Manuscript
1. Only one thought per sentence
2. Use paragraphs to group related thoughts
3. Get rid of unnecessary words
4. Do not use redundant words/phrases
5. Choose the shortest and clearest word/phrase
6. Use active voice whenever possible
7. Do not be ambiguous
8. Make sure that you have parallel grammatical structure
9. Use consistent verb tense
10. Do not repeat the data/facts throughout the manuscript
11. Write your abstract last
12. Title is the most important word construction in your manuscript
Appendix: Division of Laparoendoscopic and Bariatric Surgery at the University of Miami Miller School of Medicine: tips to research and publishing

Tips to writing

1. Abstract writing for meetings
   a. Introduction
      i. 3 sentences
   1. Overall issue
   2. Specific issue
   3. Hypothesis (state the word “hypothesis”)
   b. Methods
      i. 3 to 6 sentences
      1. Groups used
      2. Intervention
      3. Outcome measures
      4. Statistical analysis chosen (if room)
   c. Results
      i. 3 to 6 sentences (plus or minus a table)
      1. Total sample size and sample size per group
      2. Comparison with \( p \) value
   d. Conclusion
      i. 3 sentences
      1. Summarize results
      2. Do not overstate conclusion
      3. Did you prove or disprove your hypothesis?
   e. Keep the stuff that does not fit to use for when you write the paper
   f. Title
      i. Make it short but not too short
      ii. Make it sweet but not too sweet
      iii. Do not state your conclusion in your title
      iv. Use catch/“sexy” phrases
      1. “Randomized trial,” “controlled,” “training,”
         “laparoscopic,” “endoscopic,” “natural orifice
         transluminal endoscopic surgery,” “inflammatory
         mediators,” “virtual reality”
   v. Avoid dull phrases

1. “Retrospective,” “observational,” “review”
   vi. Use a question as a title carefully (“Does
       pouch size matter?” “What is the best
       method for training residents in ERCP?”)
   vii. Examples:
      1. “VR training demonstrates improved ERCP skill
         acquisition”
      2. “Randomized controlled trial of methods for ERCP
         skill acquisition”

2. Write the paper
   a. You have done the work already—now just write it
   b. Writing skills are not needed
      i. You do not have to write well; you just need to
         edit, edit, and edit
      1. Don’t worry about how it looks while you write it
      2. Forget about grammar and syntax; don’t worry about
         run-on’s, etc. (on your first draft)
      3. Just get the idea down
   4. It is much easier to edit a paper that is written than
      one that is not written
      ii. We all do stuff with which we are comfort-
          able and perform well (human nature)
   1. Much rather be doing procedures—we all are good at
      doing them
   2. Only the rare surgeon likes to write
   3. Motivation
      a. You need to publish; otherwise nobody knows
         who you are
      b. You need to publish to get promotion, tenure,
         better positions, etc.
      c. You can still be in academics and not publish
         i. Limited status and slower advancement
      c. Abstract
         i. See earlier
         ii. Change table to text
      d. Title
         i. See earlier
         ii. Review
      e. Introduction
         i. Use only 20% of your references
         ii. 1 page
   1. First paragraph
      a. General background/importance
2. Second and third paragraphs
   a. Current literature to show why you did the study

3. Last paragraph
   a. Build up your hypothesis
   b. Last sentence should be your hypothesis/purpose
      i. Also use the word “hypothesis” (first choice) or “purpose” or “objective”

f. Methods
   i. 1 to 2 pages

1. Time span
2. IRB/animal protocol approval
3. Groups chosen
4. Inclusion/exclusion criteria
5. Treatment/control group
6. Diagram if helpful
7. Outcome measures
8. Last paragraph description of statistics included statistical program used

3. When to do this? (i.e., When do I have time to do it?)
   a. Boring meetings/conference, bring a manuscript to review/edit
   b. Between cases
      i. Computers everywhere
      ii. Use UM system and save on the intranet
      iii. Type on PDA
   c. Carry a paper to edit or a reference to read around with you at all times
   d. “Grunt work”—collecting data should delegated
   e. Inputting data should delegated
   f. Assign tasks (premedical students, medical students, residents, fellows, other attendants) with deadlines (make the deadline earlier than you need to so you have some wiggle room)
   g. Collaboration
      i. Research is not done in a vacuum
      ii. Ask for help but expect to help

The manuscript review process

Piero M. Fisichella, Richard L. Gamelli

Department of Surgery, Stritch School of Medicine, Loyola University Medical Center, 2160 South First Avenue, Room 3226, Maywood, IL 60153, USA


Correspondence to: Piero M. Fisichella
Phone: (708) 327-2236
Fax: (708) 327-3492
email:
Abstract The manuscript review is an unbiased, independent, critical assessment of scholarly work submitted to scientific journals. This review process screens scientifically valid manuscripts and improves their quality by strengthening the author’s argument and improving the clarity of his or her presentation. This form of external control protects the readers from misinformation and confusion and gives the journals credibility. The manuscript review is a privilege and a responsibility. It recognizes the reviewer as an expert in his field selected to judge the work of his peers, and it establishes an ethical commitment toward the editor, the reader, and the progress of science. Nonetheless, specific ethical issues are characteristic of this process, and only a few journals explain them to their reviewers. Moreover, many authors are not fully aware of the reviewer’s obligations toward his or her work or the best way to respond to the reviewer’s comments. Therefore, this chapter aims to describe the manuscript review process and its core values from the reviewer’s and the author’s perspectives.

The manuscript review is an unbiased, independent, critical assessment of scholarly work submitted to journals and carried on by peer reviewers [1]. This process has been developed to screen suitable manuscripts and enhance their scientific quality and style by strengthening the author’s argument and improving the clarity of his or her presentation [2–4]. This form of external control protects the readers from misinformation and confusion and gives the journals credibility [5]. However, peer review has been criticized for being biased and not able to detect fraud [2].

Indeed, the reviewer is surrounded by bias, scientific misconduct, and conflicts of interest. Regardless, reviewing a manuscript upon invitation is both a privilege and a responsibility [6]. The manuscript review process recognizes the reviewer as an expert in his field, selected to judge the work of his peers, and decisive in contributing to the advancement of knowledge by promoting the publication of high-quality science. The editors of the journals acknowledge this privilege, usually in a specific issue, and some academic institutions consider this privilege during evaluation for promotion. This privilege brings prestige to the reviewer. Both are the reviewer’s rewards for an effort often involving a great amount of time and energy that the reviewer performs voluntarily and without compensation [5]. Yet, by reviewing a manuscript, the reviewer is bestowed with the ethical responsibility toward the editor, the reader, and the scientific community to provide a fair and constructive critical review.

The Achilles’ heel of reviewers is their inexperience in the critical review of a manuscript. Because experience cannot be taught, reviewers are compelled to master this skill with practice. Reviewers may possess adequate critiquing skills, but they sometimes find themselves, especially the young ones, drifting in an uncharted sea, unaware of the steps involved in the delicate process of judging and improving the work of others. Furthermore, formal teaching in critical manuscript review for a scientific journal is not established during training, and the techniques learned during journal club experience are inadequate for this task [6, 7]. In addition, few journals explain this process or its ethical principles to their reviewers, and many authors are not fully aware of the reviewer’s obligations toward his or her work or the best way to respond to the reviewer’s comments [8].

The review process starts after a manuscript is submitted to a scientific journal. Once the manuscript reaches the editorial office, the editor of a subsection or subspecialty assigns it to selected reviewers. The reviewers can be members of the journal’s editorial board, can be selected by the editor or by the members of the editorial board on the basis of their academic accomplishments or publication track, can be suggested by the author, or can be chosen on the basis of a researcher expressing potential availability by a letter sent to the editor. Members of the editorial board serve regularly as reviewers, whereas ad hoc reviewers are expert peers selected to review manuscript on a case-by-case basis.

In general, this method of selection does not identify the best reviewers. Schroter et al. [9] have shown that the quality of review is the same whether the reviewer is suggested by the author or selected by the editor. Specific characteristics of the reviewer may instead play a role in his or her ability to perform a high-quality review. In general, young reviewers, juniors in academic status, at a top academic institution and with extensive reviewer experience, are thought to provide better reviews and more critical appraisals [10–12]. However, Black et al. [13] showed that reviewers younger than 60 years and those with training in biostatistics or epidemiology submitted high-quality reviews in terms of content and completeness, but they were unable to assess whether the reviewer’s judgment was accurate.

Interestingly, it has been shown that the author-suggested reviewer is more prone to make a more favorable recommendation for publication [9]. To obviate this potential bias, some editors regard the reviewer as a consultant and not as “gatekeeper” [2]. In the former case, the editor, usually after a collegial discussion among other members of the editorial board, makes the final decision on the fate of the manuscript by considering the reviewer’s technical opinion [2]. In this case, “reviewers revise, editors decide” [3]. In the latter case, the editor assigns the manuscript to a reviewer and by relying on the reviewer’s comments, ratings, and recommendation for publication, the editor hands over to the reviewer the fate of the
manuscript [14]. Occasionally, the editor intervenes to resolve conflicts when disagreement arises among reviewers. In this event, the editor appoints another reviewer to resolve the dispute, or alternatively, the editor reviews the manuscript personally and takes full responsibility for its acceptance or rejection.

In the vast majority of cases, reviewers are blinded to each other but not to the author. This shield of anonymity protects the reviewer with the trust that he or she will provide an honest, critical assessment of the manuscript [2]. The disadvantage of this method is that reviewers can express unkind comments more easily [2]. However, when anonymity is removed and complete transparency is adopted, as in the open review process with signed reviews and no blinding, these disadvantages are less evident [14]. Additional advantages of the open review process are that conflicts of interest may become more obvious, and the reviewer may perform a more thorough review [14]. However, in the open review process, the advantages of anonymity are lost, and the reviewers may perform a kinder, less critical review, probably to avoid uncomfortable situations when manuscripts are submitted from prominent institutions or from more senior and well-known investigators [14].

At the opposite end of the spectrum, when complete anonymity is enforced by reciprocal blinding of reviewers to authors in an attempt to increase the reviewer’s objectivity, poor-quality manuscripts are likely recommended for publication [15]. This approach also has another disadvantage: it is also hard to implement because elimination of possible clues or identifiers is technically possible in only 60% of the cases [16].

Once the reviewer has received the manuscript, he or she starts working on the assignment. Awareness of specific core values (Table 1) may help the reviewer perform his or her assignment more efficiently [2, 5–8, 17]. These specific core values also are the reviewer’s obligations toward the author’s scholarly work.

<table>
<thead>
<tr>
<th>Core values of the peer review process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expertise</td>
</tr>
</tbody>
</table>

Recognition of the reviewer’s expertise is paramount. The reviewer is chosen primarily because of his or her expertise in a specific field. Therefore, reviewers must provide their services only if they are competent in the area of the review. It would undermine the sense of trust in the authors and editors as well as the overall credibility of the process if the reviewer did not have adequate competence to review the manuscript [14].

Experience in producing good reviews comes with time [6]. Reviewers sharpen their skills with each manuscript they review. At any time, especially in the beginning or in any difficult decision, it is appropriate for a reviewer to consult a mentor for honest and unbiased advice, provided the mentor also agrees to maintain confidentiality about the manuscript and its details [6]. Consulting other colleagues is dangerous and not recommended because it constitutes a breach of confidentiality [17].

Confidentiality characterizes the reviewer’s integrity and respect for the author’s work. The manuscript constitutes privileged communication. The reviewer, entrusted with the manuscript by the author and the editor, should never copy, distribute, publicly share the manuscript, or discuss its details with others without the permission from both the author and the editor [6, 18]. Any person in contact with the manuscript, from the editor of the journal to its staff, or from the reviewer’s mentor to the reviewer’s apprentice (who occasionally is asked to participate in the review for “training” purposes), must rigidly observe the same discretion. In addition, both the editor and the journal staff also must use discretion about the reviewer’s identity during the review process and after publication of the paper [17].

Thoroughness should be well noticeable in the review. The reviewer should critique the manuscript thoroughly and systematically by analyzing every section including the title, the abstract, the introduction, the methods, the results (with table and figures), and the discussion (with the references) [5, 7]. Even if the reviewer can in time develop his or her own review technique, this approach gives the reviewer an opportunity to show thoroughness and good organization in the reviewing process as well as great familiarity with the manuscript [5]. In addition, it is a good habit to supply appropriate evidence using previous published literature to validate the critique.

Orderliness and clarity are the requisites for valuable professional communication between the reviewer and the author or the editor. A disorganized and confused critique is useless and disrespectful to both the editor and the author [5, 6].

Courtesy is an important attribute of a good reviewer. A manuscript that unfortunately needs to be rejected does not justify sarcastic or unpleasant comments, especially when expressed behind the shield of anonymity [6]. Anonymity
protects the reviewer and should allow him or her to provide only honest criticism. Therefore, a polite critique avoids resentment in a process that should be respectful per se [6].

Punctuality requires that the review be returned in a timely fashion. This establishes a courteous professional relationship between the reviewer and both the editor and the author. Reviewers should decline to review a manuscript if they are not able to provide their appraisal within the deadlines set by the editor [6].

Usefulness is demonstrated by a reviewer when he or she suggests necessary changes that improve both the scientific quality and the stylistic clarity of the manuscript [2, 5, 6]. A useful review improves the ability of the author’s work to withstand the criticism of the scientific community after its publication [2, 6]. This effort in turn helps and benefits the author, the editor, and the reader.

Objectiveness and integrity are essential to a critical yet unbiased and independent assessment of the manuscript’s strengths and weaknesses [6]. Integrity also ensures respect for the author’s intellectual property and guarantees that no potential conflicts of interest will interfere [6]. Conflicts of interest are a significant and worrisome source of bias. They can arise from personal and financial interests and are driven by personal, academic, or ideologic rivalries with the authors or by the intrusion of industry into academic institutions [1, 8, 14, 18]. This influence of industry in the review process challenges the fundamental principle of independence of the process and introduces a very dangerous bias that may influence scientific and policy decisions, potentially altering the standards of care [14]. In general, a reviewer professionally acquainted with authors or one who has a financial involvement in an industry that supports the research presented in the manuscript should declare his or her conflict of interest and decline the invitation to review that manuscript [1, 4, 6]. Another scenario also may occur, in which the reviewer is in doubt about the presence of a conflict of interest. In this case the reviewer can always contact the editor to discuss the appropriateness of the reviewer’s disqualification [8].

The Uniform Requirements for Manuscripts Submitted to Medical Journals: Writing and Editing for Biomedical Publication published by the International Committee of Medical Journal Editors (ICMJE) extensively explores and scrutinizes potential conflicts of interest related to individual authors’ commitment, project support, and commitments to editors, journal staff, or reviewers [1]. This document encourages reviewers with conflicts of interest to disclose them and to disqualify themselves from reviewing a specific manuscript if they think such a disqualification would be appropriate [1]. At the same time, this document encourages editors to ask reviewers to state explicitly whether conflicts of interest do or do not exist.

Besides ensuring that conflicts of interest do not play any role in the objective assessment of a scholarly work, integrity and honesty also obligate the reviewer to report scientific misconduct, when detected, to protect the integrity of research. Scientific misconduct, as defined by the National Academy of Sciences, includes fabrication, falsification, or plagiarism in proposing or performing research or in reporting findings [19]. However, errors in judgment, differences of opinion in the interpretation of data, and errors in analysis of data do not constitute scientific misconduct [1].

In reality, it is not easy for the reviewer to detect scientific misconduct. The reviewer is not a detective. He or she is required to give an independent and objective technical opinion on the originality and scientific validity of the research, not on its trueness. This is the author’s responsibility toward the scientific community and the progress of science.

The core values we have described underscore the duties and responsibilities of the reviewer, placing the emphasis on the structure of the review rather than its content. However, it is the content of the review that determines its quality. A high-quality review is one that reflects the accurate judgment of the reviewer [2]. The reviewer must be able to spot the scientific value of the work by judging to the best of his or her capabilities the originality of the work, the validity of the design, the methodologic strengths and weaknesses of the research, the quality of the data, and the interpretation of the conclusions [2].

After assessing the manuscript, the reviewer is requested to present a critique with his or her comments. In most instances, the reviewer also is requested to provide a recommendation for acceptance, rejection, or revision. It is crucial to understand that whereas the core values of this process are objective principles that can guide reviewers in shaping their critique, the final recommendation of the reviewer is a critical decision based only on the reviewer’s subjective interpretation of the author’s work [7].

The decision to accept a manuscript is almost always accompanied by minor requests for corrections, and it is easy to formulate when the work is scientifically sound and well presented. The decision whether to reject a manuscript or recommend a major revision is more problematic. When this scenario is likely, it is suggested that before deciding on a recommendation the reviewer should develop a written critique and subsequently reexamine it [6]. This review of his or her own critique after undergoing the mental effort of outlining it should enable the reviewer to develop a more detached and more objective position [6]. At this point, the reviewer should carefully weigh mentally what the major obstacles in the manuscript are that hamper its publication.
Table 2 Reviewer’s self assessment checklist

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did you address any potential conflict of interests?</td>
<td></td>
</tr>
<tr>
<td>Did you think the paper is appropriate for the journal?</td>
<td></td>
</tr>
<tr>
<td>Did you discuss the originality of the paper and its contribution to the field?</td>
<td></td>
</tr>
<tr>
<td>Did you spot the methodological strengths and weaknesses of the research? (e.g. validity of the experiment; testable hypothesis; appropriate selection of patients and controls; generalizability of the results)</td>
<td></td>
</tr>
<tr>
<td>Did you comment on the author’s interpretation of the results? (e.g. is there the possibility that the results can be due to other factors or other scientific mechanisms than the ones suggested by the author? Are the conclusions based on the results?)</td>
<td></td>
</tr>
<tr>
<td>Did you comment on the style of the manuscript? (e.g. tables, figures)</td>
<td></td>
</tr>
<tr>
<td>Did you give clear, fair, polite, and constructive feedback?</td>
<td></td>
</tr>
<tr>
<td>Did you address any potential ethical concerns or scientific misconduct?</td>
<td></td>
</tr>
<tr>
<td>Did you make sure that your comments are consistent with your rating, and recommendation?</td>
<td></td>
</tr>
</tbody>
</table>

and decide [6]. Inappropriateness of the work to a specific journal or a study that lacks internal and occasionally external validity is almost always rejected. After the decision is made, it is useful to go over the critique again with a look at the checklist shown in Table 2. This self-assessment checklist may help the reviewer to evaluate his or her performance and improve the critique once again before sending it definitively to the editor.

Once the review is turned in with a recommendation for a major revision, the author will respond to the critique by following the reviewer’s recommendations and by addressing specific critical issues. The author’s response is extremely important for the fate of the paper. The response is provided in a separate letter to the editor and accompanied by a revised manuscript. The author’s response should be concise, should answer point by point the reviewer’s comments, best if supported by relevant literature, and should be polite. In addition, the author should submit a manuscript in which his or her changes can be clearly tracked. One of the most reported complaints from reviewers is that they cannot track the changes to those portions of the text for which they recommended changes.

Currently, almost all submissions of scientific manuscripts are done electronically, with manuscripts prepared using commercially available software for text editing. The most commonly used software, such as Microsoft Word and Apple Pages, contain a useful feature that tracks the changes in the manuscript. Using this feature or highlighting the changed portion of the manuscript can tremendously help the reviewer revise easily in a short amount of time the significant portions of the manuscript.

Once the review is turned in with a recommendation for rejection, the author, guided by the reviewer’s critique, usually rewrites the manuscript, making drastic changes in the design, methods, and interpretation of the results. Then the author will resubmit it to a different journal. In his study, Weller [20] also has shown that 15% to 20% of papers rejected are eventually published in another journal after resubmission and review.

In general, the review process is well perceived by authors. A study that surveyed the editorial peer review experiences of authors who published in indexed U.S. medical journals showed that more than 60% of the authors thought the peer review had offered constructive suggestions, changing the conclusions of the article less than 3% of the time [21]. Specifically, authors thought the review process improved content in 38% of cases, enhanced organization in 23% of cases, and clarified conclusions in 23% of cases [20]. In addition, less than 4% of the authors showed concern over potential reviewers’ bias [20].

In rare cases, however, the author may disagree with the comments of the reviewer. The author may perceive unfairness or conclude that the reviewer did not understand the manuscript. In response to these unpleasant episodes, the author can decide to disregard the recommendation of the reviewer and withdraw the manuscript or to report his or her concerns to the editor, who will take the responsibility to decide for him- or herself. This decision usually is prompt and measured because the editor constantly needs to maintain the high standards of his or her journal.

The manuscript review process is therefore imperfect, but essential [2]. Science has always progressed though academic discussion. This discussion entails a constructive dialogue among colleagues about ideas and scientific results. This dialogue takes place during professional meetings, for example. Therefore, without any form of constructive dialogue or debate, such as that present in the process of peer review, scientifically valid research will be blended with worthless or even fraudulent research, with the result that merit will plummet while entropy soars [2, 14]. It therefore is not surprising that the Center of Scientific Review (CSR) of the National Institutes of Health (NIH) has implemented two levels of review. In the first level (the study sections), the scientific and technical merit of the author’s research proposal is evaluated. In the second level (the advisory councils), funding decisions are made on the basis of funds allocated for worthy research projects [21]. The NIH firmly believes in the peer review and is relentlessly enhancing this process to fulfill its ethical mission of supporting the most meritorious and scientifically valid research [21].

Because of its imperfections, the manuscript review process still needs changes and adjustments. The future of peer review still is a matter of great debate in the scientific community. An online accreditation system for the reviewers of biomedical journals may soon be available.
and required [14]. In the meantime, some journals, such as *The British Medical Journal* and *Annals of Emergency Medicine*, have already implemented an online training package and exercises for reviewers [22]. Publishers such as Elsevier that have understood the great respect and credibility provided them by the review process also have entered this arena by implementing specific courses and resources for reviewers [23]. Other journals, such as *Medical Education*, simply provide online guidelines for reviewers on the journal’s Web site [24].

In conclusion, reviewing a manuscript is a privilege and a responsibility, especially for young academic investigators. This process also is imperfect but necessary and still evolving. Awareness of the core values of this process can help reviewers to shape a good critique and assist authors in understanding the reviewer’s obligations. In the end, a high-quality review is most helpful to the author. Such a review is determined by its content and reflects the judgment and experience of the reviewer.

**References**

12. Multiple blinded reviews of the same two manuscripts: effects of referee characteristics and publication language (1994) JAMA 272:149–151
Career planning: selecting the right practice: taking the clinical track in academic surgery

Sharon Bachman

University of Missouri


Correspondence to:

Several types of academic appointments may be given to young surgeons at the start of their faculty career. These include the titles of rank (assistant, associate, and full professor) and the track of the appointment. The clinical track is primarily designed for physicians whose responsibilities are concerned almost exclusively with patient care activities, teaching, and service. These physicians will have limited opportunity to engage in the research activities generally required for the granting of tenure. Research tracks are designed for faculty members whose responsibilities are concerned almost exclusively with research. These faculty members will have limited responsibility for teaching and service activities. They may be tenure or non–tenure tracked.

Academic institutions award academic rank and tenure to recognize and promote excellence in teaching, research, and service (including health care). Independently of tenure status, a faculty member has the right to be considered for promotion at intervals during his or her career. The bylaws of each institution determine the promotion schedule.

Tenure

Traditionally, tenure is awarded to safeguard academic freedom within a university setting. Achieving tenure means that a faculty member is subject to dismissal only for cause (usually an egregious act), achievement of retirement for age, or termination because of formal discontinuance of a program or department of instruction.

In addition to job security, tenure also includes a certain amount of financial security. A percentage of the salary for a tenured faculty member has traditionally been guaranteed by the university. This has less import in the clinical medical fields than for traditional university faculty.

The role of tenure in academic surgical departments has changed over the past generation. Tenure once was expected to be the goal of academic surgeons. However, this is changing because the current relevance of tenure is questioned, especially with regard to medicine. Currently, one benefit of tenure is the ability to apply for certain grants restricted to scientists on a tenure track. It also implies an academic cachet, and in certain scientific circles, it is expected that an academic surgeon is on a tenure track.

However, a tenure track can have significant disadvantages for a surgeon. Anyone entering a tenure track needs to have a thorough understanding of the tenure “clock.” Each institution’s bylaws document the year that tenure track faculty must submit their dossier to the promotion and tenure committee for consideration to receive tenure. This frequently is between year 5 and 7 after an academic surgeon’s initial hire as an assistant professor. If tenure is denied, it is expected that the faculty member will leave the institution.

Each institution lists the requirements necessary for achievement of tenure. Traditionally, a candidate must demonstrate excellence in research, teaching, and clinical duties, and must have significant service contributions to the institution. However, some institutions are friendlier about allowing clinical contributions to count toward tenure. Others require significant scientific accomplishments (i.e., obtaining an RO1 grant) for achievement of tenure. In those institutions, most surgeons should not be on a tenure track. The Assistant Professor of Clinical Surgery title would be more appropriate in this scenario.

Promotion

Independently of tenure status, a faculty member has the right to be considered for promotion at intervals during his or her career. Most institutions strive to have equitable promotion systems between all tracks offered. Whether a surgeon is on a tenure or non–tenure track, the criteria necessary for the surgeon to move from assistant to associate professor, and finally to full professor, will be listed in each institution’s bylaws. For a clinical track, this may include demonstrating growth as a clinician and educator, functioning independently in teaching, participating in scholarly endeavors (reviews, textbook chapters, clinical research) and service or administration (clinical institutional and departmental committees, lectureships, grant administration, civic and community efforts), and producing evidence of professional attainment such as involvement in national professional organizations and outside consulting.

New hires

Many young academic surgeons are being hired initially into a clinical track. Although this may seem disappointing to a motivated young surgeon-scientist, it actually may be an advantage toward eventual successful tenure reviews. A young surgeon’s first year as a new attending surgeon is a hectic one. Attending surgeons may be overwhelmed with new responsibilities. They must establish their clinical
duties and develop their practice, and at this point, most surgeons will have no research staff or funding. Several years may be required to get preliminary research funded and completed. To produce a successful K08 grant also can take 2 to 3 years.

When a job on the tenure track is started, a virtual stopwatch begins running in the dean’s office. Within a certain number of years (usually 5–7), the candidate must present his or her dossier to the P&T committee. If 4 of those years have been spent just obtaining enough funding to finance a new lab, it is unlikely that the candidate will obtain tenure, and he or she may have to leave the institution.

Delaying entry into the tenure track can offer some extra cushion time while young researchers get themselves established. Communicating clearly with the department chair at the time of hire can establish a plan whereby a young researcher who shows good progress can change to the tenure track after a year or two. This also helps to address the high attrition rates seen with first jobs after completion of training.

Summary

Do not refuse a good academic offer only of the basis of the track. Have a frank discussion with the department chair about your goals and expectations at the time of your hire. The chair may have a better understanding about the subtleties of the particular institution. The clinical track is a good option for those whose academic interests lie more in operating and teaching. There is less pressure to obtain outside research funding. Even if you be subject to annual review and contract renewal, there is no “firing deadline.” After you have established research, with monies coming in, it is possible to renegotiate for the tenure track.

Taking the educator track in academic surgery

Dimitrios Stefanidis

Carolinas Medical Center, Charlotte, NC, USA

Correspondence to:

The academic mission of every department of surgery consists of three main goals: excellence in patient care, research, and education. Historically, academic productivity and advancement in surgery was dependent on the number of grants and publications garnered by faculty members. At the time of promotion, the surgeon’s curriculum vitae, which detailed this information plus awards and honors, was reviewed by the promotion and tenure committee, and this review was adequate for a decision to be made. As academic faculty realized that the rewards were granted for research and not teaching, they devoted less time and attention to educating medical students and residents. Physicians interested in the practice of clinical medicine and teaching and not research tended to avoid entering academic medicine. The changing face of health care delivery in the United States, with decreasing reimbursements and financing, has forced academic centers to place more emphasis on delivery of patient care to finance medical student and resident education.

The deemphasis on the value of teaching has been questioned by educators who believe that teaching should be the core mission of an academic center/medical school. In addition, the increased competition for research grant support and the greater accountability for educational guidelines and standards have increased the complexity of achieving excellence within each mission goal.

Retaining clinician educators hired for patient care and teaching continued to be difficult because the criteria for promotion still were based on research productivity. This led to the creation of different academic tracks such as those of the clinical surgeon, clinical scholar, surgical educator, and surgical scientist. By allowing surgeons to follow one of these tracks, academic centers promote individual excellence and achieve their mission as a team.

The surgical educator track is an established and rapidly evolving field. The primary goal of the faculty in this track is excellence in clinical teaching and the advancement of surgical education through research. Usually, 50% to 75% of the faculty member’s time is allocated to clinical activities so he or she can establish a solid patient base to produce reimbursement for the department and make teaching possible. The remainder of the faculty member’s time is devoted to participation in educational programs, research, and administration.

For the young surgeon who enters this academic track, the most important first step is to find a mentor and assess his or her career needs. Short- and long-term goals should be defined, and a strategic plan to achieve them should be created. A variety of goals should be chosen, ranging from easy to achieve to difficult to achieve to almost impossible to achieve. In addition, the surgeon should carefully evaluate current activities to determine whether they are contributing to his or her goals. The strategic plan should be discussed with the surgeon’s mentor, modified as needed, and shared with the program director or chairman to obtain support. It is important that the young faculty member not become overwhelmed with minutiae and learn to delegate as much of the routine day-to-day work as possible.

Because instruction in teaching methods is not part of the surgeon’s training, the young surgical educator should
invest time for personal study and participate in appropriate courses that will make him or her a better educator. Observing the teaching methods of senior, experienced teachers in the department or institution and requesting advice from them may be an invaluable source for learning. Excellent resources for helpful information include the Educational Clearinghouse of the Association for Surgical Education (ASE) and the Surgeons as Educators Course of the American College of Surgeons (ACS). Other choices include obtaining a Master’s in Education degree, offered by some institutions as a summer course, and available by attendance at local or national workshops offered during meetings.

If the surgeon’s institution has a department or division of education, the young educator should contact the department to obtain additional help. Participation in local educational activities and collaboration with educators from other departments is helpful for expanding teaching knowledge. In addition, it is helpful to get involved in national “educator-friendly” organizations or committees such as the Association for Surgical Education (ASE), the Association of Program Directors in Surgery (APDS), the ACS Graduate Medical Education and Surgical Education in Medical Schools Committees, and the Association of American Medical Colleges (AAMC).

After these first steps, young educators should enlist other faculty to buy into the importance of teaching and decide how they will evaluate their teaching effectiveness. Establishing awards for both learners and faculty helps to promote resident competition and faculty participation. In addition, the educator must learn how to evaluate his or her students and what tools to use for that purpose. Having appropriate evaluation tools is of paramount importance because they can capture the impact of teaching on learner knowledge and performance and document effectiveness of educational methods.

In choosing or creating an evaluation tool, the following questions should be answered. Who will be evaluated: faculty or residents? Who will choose which faculty and residents will be evaluated? When will the evaluation form be completed? Will the evaluation be anonymous? What format will be used for the evaluations: checklists, Likert scales, multiple-choice items, focus groups, or other? Who will collect the completed evaluations? Who will have access to the completed evaluations, and who will tabulate the results? How will the results of the evaluations be used (for promotion, awards, or adjustment of curriculum)? Are student evaluations the only way teaching is assessed? Are other methods such as peer evaluation by faculty, self-evaluations, or outside experts needed?

When an evaluation tool is incorporated, the following stepwise approach should be used:

- Step 1. Gather information. Conduct a literature review and evaluate educational instruments already used by colleagues.
- Step 2. Assess needs. Decide what behaviors, qualities, or outcomes you want to evaluate.
- Step 3. Plan. Choose the format that will enable you to evaluate these factors and decide how to evaluate the results.
- Step 4. Pilot test the plan. Administer the instrument to a group of representative individuals and evaluate the results.
- Step 5. Assess. Assess the strengths and weaknesses of the tool and the problems encountered during its initial administration.
- Step 7. Implement. Begin to use your revised instrument and periodically assess its effectiveness.

Repeat steps 4 through 7 as necessary to improve the tool.

Educational research should be part of a young educator’s activity. Its goal is to create evidence-based training paradigms and advance the field of surgical education. A literature review of teaching methods is helpful early on before a new teaching method is introduced. Through the incorporation of a pre- and postassessment and a control group, the effectiveness of the educator’s interventions should be measured and documented. This will help modify teaching approaches and assist in the choice of the best educational methods.

The 80-h workweek has sparked the surgical community’s renewed interest in this type of research, resulting in effort to identify the most effective methods for resident training at a time when teacher–resident interaction is limited. Because educational research differs in many ways from standard clinical research and includes both quantitative and qualitative aspects, formal training in these methods should be sought. Such an opportunity is offered in the Surgical Education Research Fellowship program (SERF) of the ASE. This is a 1-year, home-site fellowship designed to equip investigators with the skills and knowledge needed to plan, implement, and report research studies in the field of surgical education.

Moreover, the relatively recent incorporation of simulation in our teaching armamentarium has introduced an exciting training tool that opens many research venues for young investigators. Funding for such projects is limited, but several surgical societies offer grants to support this type of research including the SAGES research grants, which typically fund several educational research projects each cycle; the CESERT grant of the ASE; and the METI grant offered by the ACS. Additional funding at a higher sum is expected to become available in the future.
Common errors committed by young educators include not having the support of their chairman, becoming isolated, underestimating the need for staff and administrative support, and not staying in touch with the needs of the faculty, students, and the medical school. The young educator should seek the support of his or her chairman to overcome potential obstacles, to enlist additional faculty, to participate in school-wide educational initiatives and involve colleagues in the planning of educational projects, to avoid getting overwhelmed by paperwork and other minutiae by delegating work to support staff, and to stay in touch with all the stakeholders and be responsive to them.

When juggling clinical and educator responsibilities, surgical educators should maintain their clinical role in the department to support their educational activities and keep track of the time spent on them. The CV is not adequate for documenting many of these activities. It does not include the evaluation of work performed or detailed information on teaching activities. Consequently, when the time for promotion comes, many educators are inadequately prepared to document their teaching efforts. In a survey of deans, chairs, faculty, and promotion and tenure committee members, the following problems in trying to measure educational productivity were mentioned:

1. Inability to evaluate the quality of teaching
2. Sporadic faculty evaluations whose quality and frequency are dependent on the interest and competency of the departmental or divisional chair
3. Lack of standardized methods for gathering peer evaluation of teaching
4. Lack of a clear understanding by the faculty of the requirements for promotion and tenure
5. No documentation of excellence in educational activities provided to the promotion and tenure committee at the time of the request for promotion.

Therefore, the creation of a comprehensive teaching/educator’s portfolio for the documentation of educational activities has been recommended. This approach has been adopted by an increasing number of academic centers. A survey of medical schools showed that the four most important criteria for judging the clinician-educator’s performance were awards, peer evaluations, learner evaluations, and teaching portfolios. Another publication identified publishing on educational topics, securing funding for educational research, recognition for teaching excellence via teaching awards, and active participation in education groups on a national level, ideally in an officer role, as the important components leading to promotion.

A teaching portfolio is a collection of materials documenting a faculty member’s teaching performance over time. Its contents are highly diverse, reflecting the activities and philosophies of its creator. Every good portfolio should contain, at a minimum, materials that are the products of good teaching, evaluations, and comments from others about these products, as well as a personal statement reflecting the faculty member’s philosophy of education. The purpose of the portfolio is to demonstrate “excellence” and “satisfactory competence” in teaching for promotion and tenure decisions. Furthermore, it can be used to document productivity during periodic evaluations by supervisors, to prove excellence resulting in teaching awards and awarding of grants, to demonstrate past achievements when application is made for new positions, and, most importantly, to facilitate critical self-reflection on teaching for the purposes of continued improvement.

The first step in the creation of a portfolio is to determine whether the institution already uses and requires a specific one and whether its format and contents are mandated. If these guidelines exist, they should be followed to the letter. If they do not exist, the young educator should construct a portfolio. A tabbed three-ring binder should be used to file all applicable documentation and kept in an easily accessible place. Material should be added as it is generated, and electronic copies should be created at regular intervals.

The key elements of a portfolio include a narrative describing the philosophy of education, a list of teaching and scholarly activities, documentation of recognition of excellence in teaching, courses taken and study to increase educator expertise, and a listing of publications.

The Philosophy of Education section, also known as the reflective statement, contains the faculty member’s philosophy and goals as a teacher, an assessment of his or her success as a teacher over a specific period, identification of areas needing improvement, and plans for successful improvement. It is a statement articulating the educator’s view of the most effective way to teach and how his or her activities were used to ensure the learning of students and residents. It explains how these activities furthered the goals and mission of the department or institution and how they were shown to be effective. This section is designed to put the contents of the portfolio in a meaningful context.

A core element of all portfolios should be a listing, with a measure of extent, of all teaching activities including traditional instruction, teaching in a clinical and lab context, advising, organization of workshops and continuing education or participation in them, the committees or panels on which the educator served, and the like. The Teaching and Scholarly Activities section also should include evaluations generated from clinical supervision of medical students and residents and should be updated yearly. The Recognition of Teaching Excellence section includes teaching awards and honors received as well as evaluations of the educator’s teaching by both learners.
(undergraduate and graduate students, residents, and fellows) and peers who have observed the faculty member. Some educators also include thank you letters received regarding educational activities from course directors or students they have supervised, mentored, or advised.

Whereas evaluation by both peers and learners is required, the extent and format of the data required usually are determined by the educator’s department. Typically, the department collects and maintains these evaluations and includes representative pieces of this information in the teaching portfolio at the time of consideration for promotion and for discussion at the annual review.

A list of formal courses taken and self-study pursued to increase expertise in teaching also should be part of the portfolio. This section demonstrates commitment to increasing educator expertise and displays the credentials accumulated in the area of education. Intuitively, a listing of publications pertaining to education also should be included. Besides peer-reviewed publications, other authored educational materials such as educational software, published curricula, videotapes, and multimedia materials belong to this section. If the material has not been published in a peer-reviewed venue, there should be a clear description of the manner in which the material was used and evaluations by learners or peers pertaining to its effectiveness.

The uses of such a portfolio are manifold. Its main use, as stated, is for the documentation of excellence in teaching when credentials are submitted to promotion and tenure committees. In addition, it can be used for demonstration of productivity during periodic evaluations by supervisors, for proof of excellence resulting in teaching awards and awarding of grant applications, for demonstration of past achievements during application for new positions, and more importantly, for critical self-reflection on teaching for the purposes of continued improvement.

In conclusion, young surgeons who wish to follow the surgical educator track in academic medicine should create a strategic plan for their career, expand their knowledge on teaching methods, get involved in educational research, and choose evaluation tools for their learners and faculty to document the effectiveness of their teaching interventions. Most importantly, educators need to create a teaching portfolio to demonstrate educational efforts and successes when their productivity is evaluated for promotion or other purposes.

It is an exciting time to be a surgical educator!

Resources


Trade-offs in academic surgical career development: calibrating expectations against the reality of limited resources

Jeffrey B. Matthews

Department of Surgery, The University of Chicago Medical Center, 5841 S. Maryland Avenue MC5029, Chicago IL 60637, USA

Correspondence to: Jeffrey Matthews
Phone: (773) 702-0881
email: jmatthews@uchicago.edu

As academic surgeons, we each strive to find a balance between the limitless aspirations of our dreams and the limited resources of reality. Whether it is salary, personnel, laboratory space, equipment, discretionary funds, or time (that most precious of resources), each of us encounters boundaries and barriers that will force personal and professional trade-offs. Given our idealistic tendencies, we may be unaware or even deny the inevitability of such trade-offs. Yet, in a sense, our ability to manage these trade-offs successfully sets the stage for future achievement. Conversely, our failure to prioritize effectively may foreshadow missteps. Like Mentor of Odyssean mythology, a trusted advisor or senior colleague can help us navigate the complexities and temper our frustrations with the limitations of available resources. In the words of the author’s own mentor, Dr. William Silen, “young surgeons want to surge.” Along with energy and enthusiasm, new faculty members may bring unrealistic expectations that can lead to disillusionment and disappointment.
Trade-offs in professional effort

Most academic surgeons divide their professional effort between the practice of surgery and the academic arena, whether as a classical surgeon-scientist, a clinical investigator, or a clinician-educator. After nearly a decade of residency and fellowship, the newly minted surgeon may be understandably impatient for a challenging clinical practice and operative independence. Rarely does the first faculty appointment include a ready-made patient base with both the volume and complexity to match the richness of the training experience. Most young surgeons, although perhaps secretly hoping otherwise, accept that clinical reputations and a steady stream of directed referrals usually take years to build. Despite this, they also may feel pressure (often self-generated) to “prove themselves” or otherwise accelerate the process. A premature emphasis on practice development may derail progress toward critical early career milestones such as securing extramural funding or publishing original articles. It probably is wiser in the long run to focus on establishing early scholarly credibility rather than clinical credibility.

However, the economic impact of clinical practice notoriously clouds judgment and influences the relative priorities of even the most dedicated young academic surgeon. After all, clinical activity generates revenue that may significantly offset start-up investments and over time grow not only to cover ongoing expenses (perhaps leading to a bonus or a raise) but also to render the department’s resource pool replete for future recruits.

In contrast, research activity requires significantly greater initial support. It is unusual, even with significant extramural support, for a laboratory effort to become completely budget neutral. Thus, considerable incentives often exist that reinforce clinical productivity. The value of scholarly work by comparison seems less tangible, with “softer” rewards. In this respect, it is crucial to align expectations for clinical and academic productivity among the multiple stakeholders (often including colleagues, section chief, department chair, hospital leadership) invested in the success of the new recruit. A thoughtfully constructed document that outlines goals, benchmarks, and incentives, as well as expectations for revenue generation and grant submission, may help insulate faculty from distractions and pressures that might otherwise compromise academic career development. In the author’s experience, this approach is far more effective than vague commitments of “protected time.” Ultimately, of course, the day-in, day-out choices are in the control of the faculty member. No contract or set of incentives will overcome a fundamental mission—vision—values mismatch between the individual and the academic enterprise.

Trade-offs also are critical in balancing professional and personal activities. Our personal circumstances and philosophies vary considerably and thus it foolish to imagine that any rules or formulas might in any way apply generally. However, in the author’s experience, it is unusual to see long-term professional success for individuals who have neglected their systems of support, whether those are through family, friends, community, or spiritual institutions. Our roles as caregivers are undermined if we cannot take care of ourselves in terms of exercise, nutrition, adequate time for relaxation, nonmedical reading, hobbies, and so forth.

Trade-offs in resources

Significant investment is always required to support a new faculty member. Regardless of the source of the needed supports (which differ greatly among academic centers depending on organizational structure, systems of accounting, endowment, and other idiosyncratic local factors), the start-up “package” must be realistically calibrated to maximize the return on the initial investment with respect to economic sustainability and academic productivity. Because resources are finite, allocation of support to various components within the overall package requires trade-offs. This is perhaps obvious: the more that is spent on capital equipment, the less will be available for, say, supplies or technical staff. Less well appreciated, however, is the undeniable impact of limited resources on the personal aspects of the package (e.g., salary, benefits, transitional costs). Of course, individual situations vary widely with respect to indebtedness, dependents, housing, cost of living, and lifestyle. Adequate resources must be reserved for academic career development lest the young faculty member be “set up for failure.” At the same time, thoughtful compromise around less critical needs can lead to greater flexibility in the overall package, including compensation.

It is important that the budding academic surgeon express an appreciation, even explicitly, for the fact that a start-up package represents an investment in his or her career, not a gift or entitlement. Like all investments, the start-up investment carries risk that the academic potential will never fully materialize, risk that the subspecialty clinical practice will fail to develop, risk that career plans will change, and risk of departure for another academic institution or community-based practice. The “investor” (the department chair, section chief, and colleagues) find it both refreshing and reassuring when a new faculty member demonstrates a sense of accountability to meet expectations and deliver a return on the invested resources.
One approach to increasing “investor confidence” is to escalate levels of resources based on reaching defined milestones rather than by a one-time lump sum allocation with no specific obligations attached.

Calibration of salary expectations requires a realistic perspective on the overall costs of start-up and some appreciation of the employment context. Salary benchmarks are available from various sources including the Association of American Medical Colleges, but although these may be useful for framing discussions, they also may be misleading. It is indeed helpful to view salary data stratified by geographic region, academic rank, type of institution, and salary benchmarks. However, like the denizens of Lake Wobegon with their universally above-average children, faculty members typically expect to receive an above-average salary. Miscalibration of expectations becomes more likely for those in positions with high academic expectations because benchmark salary data are heavily skewed toward the “pure” clinicians, who greatly outnumber the more academically committed minority. Those with full-time clinical loads command higher salaries, even during the early phases of practice development. Because clinical care is a source of both professional and facility revenue, the depth of available institutional financial support may in fact be greater for surgeons without academic ambitions.

Moreover, the absence of significant academic effort eliminates the need for a research budget, and thus the expense side of the equation is lower as well. Therefore, it would be an unrealistic for a faculty member committing a majority of professional effort in bench research to expect a benchmark salary identical to that of a full-time clinician at equal rank.

Figure 1 illustrates the start-up costs and ongoing support required for a generic surgical faculty recruit. In

![Fig. 1 Start-up support versus revenue for hypothetical faculty recruitment. Total expenses (triple line), including salary and benefits as well as personnel/administrative, and research/academic expenses (dotted line) are assumed simplistically to remain at fixed levels over the first 4 years. Revenues (dashed line) from clinical or research activities increase progressively. The shaded area represents the unrecovered investment: the difference between the revenue curve and the expenses associated with salary and personnel expenses. Expenses associated with research and academic activities reflect a further potential gap (arrows) between revenues and expenses. The faculty member should be aware of the magnitude of the total investment and the gap between clinical/research revenues and actual expenses, not only the “steady state” difference between revenues and expenses (achieved in year 4) but also the investment over years 1 to 3 as revenues ramp up over time.]

| Table 1 Financial projections for recruitment of imaginary clinical general surgeon |
|-------------------------------|----------------|----------------|----------------|----------------|
|                               | Yr 1 (000s)   | Yr 2 (000s)   | Yr 3 (000s)   | TOTAL (000s)   |
| Revenue                       |               |               |               |                |
| Clinical* (100% effort)       | $55           | 135           | 220           |                |
| Research grants               |               |               |               |                |
| Total revenue                 | 55            | 135           | 220           | 410            |
| Expenses                      |               |               |               |                |
| Relocation, Office setup      | 30            |               |               |                |
| Salary** + 28% benefits       | 192           | 192           | 192           |                |
| Staff (0.5 FTE)               | 25            | 25            | 25            |                |
| Academic allowance            | 5             | 5             | 5             |                |
| Liability                     | 40            | 40            | 40            |                |
| Lab supplies                  |               |               |               |                |
| Equipment                     |               |               |               |                |
| Technical support             |               |               |               |                |
| Total expenses                | 292           | 262           | 262           | 816            |
| Support required              | 237           | 127           | 42            | $406           |

* Assumes generation of 20-50-80% of clinical expenses over years 1-2-3

** $150,000 starting salary (at low end of benchmarks for Assistant Professor of general surgery)
Tables 1 and 2, oversimplified and conservative assumptions are used to compare financial projections associated with the recruitment of an imaginary clinical general surgeon and an imaginary surgeon-scientist at the assistant professor level, both starting at a relatively low salary of $150,000 (the AAMC assistant professor national median 2006–2007 was $225,000).

On the expense side, it is assumed that there are one-time expenses (e.g., relocation, office setup) plus recurring expenses (salary, benefits, staff, liability premiums, and various academic allowances). The surgeon-scientist also requires equipment and a budget for technical support and supplies. The clinical revenue is based on the assumption that it will cover approximately 20% to 50% to 80% of clinical and professional expenses over the first 3 years. For the surgeon-scientist, the amount of clinical effort dramatically affects the revenue side of the equation. Thus, at a 50% clinical effort (assuming 50% time “protected” for academics), revenues will be half that of the full-time clinician. Significant extramural grant support for research activities within the first 2 to 3 years of appointment is unusual. Moreover, the extent to which new grants can offset salaries and start-up expenses is both variable and restrictive.

Given these conservative estimates, it is clear that the minimum investment required for a surgeon-scientist is easily twice that needed for a clinical surgeon, and because clinical success usually is easier to predict than research success, this investment is inherently more risky. Moreover, as noted earlier, it is unusual for the hospital-side stakeholders to contribute significantly to the start-up support required for laboratory research.

### Summary

Resources to support the career of new faculty are limited, and trade-offs are inevitable. These trade-offs include the balance of effort between clinical and scholarly activities, between professional and personal priorities, and in the various components of hard support necessary during the critical first phase of the academic surgeon’s development. Recognizing the interrelationships of these resources, including the precious resource of time, is an important element contributing to long-term success and fulfillment in academic surgery.