SPECIAL FEATURE

On the determinants of academic success as a clinician-scientist

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Introduction

I believe that the determinants of academic success as a clinician-scientist (defined in terms of principal investigatorship, lead authorship, promotion, tenure, career awards, honours, power and reputation) are not "academic" (defined in terms of intelligence, theoretical understanding, mastery of a body of knowledge and teaching skills). Although some academics fail because they are crazy and others because they lack minds that are "prepared" to generate important questions based on their clinical observations, the range of their intelligence is so compressed at the top of the scale that even if it were an important determinant, attempts to correlate it with success are doomed. Furthermore, the prevalence of academic failure among those who understand the theory, know the facts, and can out-teach their colleagues, coupled to the frequency with which they are left in the academic dust by those with much smaller supplies of these attributes, are just too great to sustain that argument. While it may be that the ability to generate novel, imaginative hypotheses plays a role in the academic success of basic researchers (a field I abandoned 35 years ago), this rarely applies to the burgeoning field of patient-based and clinical-practice[1] research (where the hypotheses usually are common knowledge and often originate with patients). Finally, I assume that no reader will seriously posit that being a nice person is a prerequisite for academic success.

What, then, are the determinants of academic success? I've concluded that they are 3: mentoring, creating periodic priority lists, and time management. Before describing them I must point out that my conclusions are based for the most part on personal observations of young academics I've mentored and to whom I've taught priority lists and time management, observations of individuals who did and didn't receive mentoring or employ time management, or clearly were and were not successful, and personal experiences of being mentored by some simply wonderful and quite awful mentors. I've augmented these personal observations with the results of a PubMed search on the MeSH terms "mentors" (510 hits) and "time management" (901 hits), and the evidence I encountered there,[2–10] which includes important evidence on the experiences and perceptions of women in medicine,[11,12] supports my thesis. Finally, most of the clinician-scientists I've mentored and observed in the United States, Canada and the United Kingdom have been hospital-based internists, and I'd encourage mentors from other health disciplines to identify where the recommendations in this essay do and do not apply to those they mentor.

Mentoring

Effective mentoring is of 2 sorts, depending on whether the person being mentored is a newcomer or an established academic. When the person is a graduate student or new faculty member, I define their mentoring as the provision, by an already successful and secure academic, of *resources* (but not obligations), *opportunities* (but not demands), *advice* (but

not orders) and *protection*. By *resources* I mean providing the mentored tyro with space to work; productivity-enhancing equipment; free photocopy, email and Internet; occasional secretarial support; money to go to courses and meetings; salary supplements if fellowships don't provide for simple graces; and bridge-funding of research until their first grant is awarded. In some departments, all or most of these resources are provided by the chair, and in others, none. In either setting, the mentor should "wheel and deal" until the resources are in place; young people who are being mentored should be spared both the time and humiliation of begging for these resources on their own.

By *opportunities at the beginner's level* I mean the systematic examination of everything that crosses the mentor's desk for its potential contribution to the scientific development and academic advancement of the person being mentored, and here are a few examples. At the outset this is the opportunity to carry out duplicate, blind (and, of course, confidential) refereeing of manuscripts and grants. The comparison of these critiques not only sharpens the critical appraisal skills of junior colleagues, it also permits them to see their mentor's refereeing style* and forces them to develop their own. When possible, they should accompany mentors to both local and central meetings of ethics and grant review committees to learn firsthand how these groups function. As soon as their competency permits, requests from prominent, refereed journals to write editorials, commentaries or essays† should lead to collaboration in reviewing the evidence and the relevant literature, synthesizing it, agonizing over draft after draft‡ of it and sharing its authorship. As soon as their contribution warrants, the mentored individuals should become the lead author of such pieces, with the ultimate objective that they become the sole author (all the sooner if the mentor casts a wide shadow). Similarly, they should be offered the chance to take over their mentor's invitations and learn how to give "boilerplate" lectures (especially at nice venues and for generous honoraria). Their inclusion in the social as well as academic events that comprise the visit of colleagues from other institutions should become automatic. Going as a group to scientific meetings (especially annual gatherings of the research clan) not only provides opportunities for them to be introduced to and hear the "old farts" in the field, but also to meet and debate with other newcomers. Moreover, the opportunities to compare the impressions and ideas gained there while they are fresh, in a relaxed and congenial atmosphere, can be both fun and productive of future research (but see the warning about the opportunity costs of meetings at the end of this essay). Finally, free books and subscriptions that are of no interest to the mentor may be of high value to those being mentored and ought to be passed on to them. It is important that these opportunities are offered without coercion and accepted without resentment. Crucially, they must never involve the off-loading of odious tasks with little or no academic content from overburdened mentors to the beholden mentored.

It is useful to bring those being mentored into an ongoing research project so that they can gain hands-on practical experience, learn how to create and function as a member of a collaborative team§ and develop skills in research management. However, I think it is highly damaging to "give" or assign them a pre-designed research project as their major (e.g., thesis) learning focus. When this happens the individual being mentored is denied the opportunity (and challenge) of beginning with the broadest possible view of a problem in human biology or health care, developing the analytic and creative skills necessary for narrowing this overview down to the next

*For example, all of my criticisms of a paper or grant are stated as questions (not pronouncements), are sent (regardless of journal policy) to their authors (a practice that discourages the employment of the condescending, *ad hominem* comments that sully so many reviews) and are accompanied by a letter asking them to contact me if they "think I've been unfair or have simply missed the boat."

†Unless an invited chapter was for a very prestigious book, its authorship would add little or no weight to the curriculum vitae of any academic at the universities where I've worked.

‡Except in Ireland and the United Kingdom, my junior colleagues' initial efforts at writing have been so prolix that I asked them to prepare their second drafts using 40% fewer words. Some of my mentoring colleagues would give them a copy of *The Elements of Style* (Strunk W Jr, White EB. *The Elements of Style*. 4th ed. New York: Longman; 2000).

§Good teams are those whose membership is determined by the question being asked (rather than by interdisciplinary fad) and whose products and publications serve the needs of both science (valid, useful answers) and its individual members (i.e., first-authored publications).

logical research question to be asked about this problem and honing that question into a form that that will provide a valid, useful answer to it. These 3 skills are central to the development of all independent investigators, and without them all they can do for the rest of their careers is look for a series of less important nails to pound with the same old hammer.

Mentors should provide opportunities to observe, model and discuss teaching strategies and tactics in both clinical and classroom situations. When the mentored are invited to join a clinical team they can study how their mentors employ different teaching strategies and tactics as they move from the post-take/morning report to the daily review round to the clinical skills session to grand rounds. With time, those being mentored can take over these sessions and receive feedback about their performance. The same sequence can be applied to teaching courses and leading seminars in research methods.

As junior colleagues advance toward independence, their *opportunities mature* and incorporate 2 additional areas. The first comprises nominations to the scientific committees (e.g., grant review committees), task forces (e.g., for the development of methodological standards), symposia (especially those that result in first-authored publications) and scientific organizations that will increase their academic experience, network and recognition. The second consists of writing letters of support for their promotion and tenure and nominating them for the academic posts that will launch the next phase of their academic and career development, followed by comprehensive letters of support and continuing mentoring during the process of negotiation and recruitment.

By *advice* I mean providing frequent, unhurried and safe opportunities for junior colleagues being mentored to think their own way through their choices of graduate courses and areas of concentration, the scientific and methodological challenges in their individual projects, the pros and cons of embarking on a particular program of research with a particular set of collaborators, and their development as social beings (some mentors refuse to discuss academic issues at such sessions until they have gone through a check list of items encompassing personal and family health, relationships, finances, and the like). This advice should take the form of "active listening," should focus on their development as independent thinkers, and should eschew commands and authoritarian pronouncements.

As long as gender-based inequalities exist in running households and raising children, mentors must be knowledgeable and effective in addressing and advising around the special problems that face women in academic careers. Although only 20% of female academics in one study stated that it was important to have a mentor of the same gender,[12] it is imperative that all women pursuing academic careers have easy access to discussing and receiving informed, empathic advice about issues such as timing their pregnancies, parental leave, time-out, part-time appointments, sharing and delegating household tasks, and the like. When the principal mentor is a man, these needs are often best met by specific additional mentoring around these issues from a woman.

When listening to individuals being mentored sort through job offers, it is important for the mentor to help them recognize the difference between "wanting to be wanted" for a prestigious academic post (they'd be crazy not to feel this way) and actually "wanting to do" the work involved in that post (which, on reflection, the individual might recognize as ill-matched to her or his interests, priorities, career stage, competencies or temperament).

By *protection* I mean insulating the individual being mentored from needless academic buffeting and from the bad behaviour of other academics. Because science advances though the vigorous debate of ideas, designs, data and conclusions, junior colleagues should get used to having theirs subjected to keen and critical scrutiny. By the same token, they needn't be tossed in at the deep end. Thus, for example, they should be invited to rehearse their presentations in front of their mentor so that every statement and slide can be challenged in a relaxed and supportive setting where presentations can be revised and responses rehearsed. The objective here would be for the toughest, most critical question about the work to have been raised for the first time during its rehearsal, not after its final presentation. Similarly, critical letters to the editor following their first publication can be recognized for what they almost always are: an attempt to show off and win at rhetoric rather than to promote understanding. Mentors can help them learn

how to protect themselves by generating responses that re-summarize their key conclusions, answer substantive questions (if any), and remain aloof from the tawdry slurs that their detractors attempt to pass off as harmless wit. Finally, disputes between senior investigators often are fought over the corpses of their graduate students, and mentors need to intervene swiftly and decisively whenever they detect such attacks on their junior colleagues, especially those related to gender, race or sexual orientation. The intention of rapid retaliation is not so much to change the attacker's point of view but to make the repercussions of picking on young investigators so unpleasant that he (or she) never tries it again. If not already introduced, the classic on "how to swim with sharks" can be integrated with the foregoing.[13]

I don't believe that academics ever outgrow their need for mentoring. As they become established investigators, they require gentle confrontation about whether they are becoming recognized "experts" and taking on the bad habits that inevitably accompany that state.[14] And, given the huge number of highly prestigious but simply awful chairs and deanships that are pressed upon even unsuccessful academics, these offers need the dispassionate (even cynical) eye of a colleague who can help distinguish the golden opportunities from the black holes. Finally, mentors can help senior academics find the courage to seize opportunities for radical but fulfilling and even useful changes in the directions of their careers. For example, I am ever indebted to my then-mentor Bill Spaulding, who helped me confirm the sense and then find the courage to repeat my internal medicine residency shortly before my 50th birthday.

What are the prerequisites for a good mentor for newcomers to the field? I think there are 5. First, mentors have to be competent clinician-scientists. Second, they must not only have achieved their own academic success but also must act like it toward their junior colleagues. That is, mentors must feel secure enough that they are not only comfortable with taking a back seat to those being mentored in matters of authorship and recognition but actively pursue this secondary role; everything fails when mentors compete with individuals they are mentoring for recognition. Third, mentors should not directly control the academic appointments or base salaries of the individuals they are mentoring, lest this interfere with the free and open exchange of ideas, priorities, aspirations and criticisms. Fourth, mentors must like mentoring and be willing to devote the time and energy required to explore and solve both the routine and the extraordinary scientific and personal challenges that arise when they take on this responsibility. Finally, mentors must periodically seek feedback so that they can evaluate their own performance, decide whether they remain the best person to continue to mentor their junior colleague, and identify ways to improve their mentoring skills.

The periodic priority list

As soon as junior colleagues being mentored gain the smallest degree of control over their day-to-day activities and destiny (say, the day of their first faculty appointment or the day after their successful thesis defence), they should be reminded (at least every 6 months, and more often if needed) that it's time for them to generate and present their periodic priority list to their mentor. Updating and discussing this list remains central to academic success throughout the rest of anyone's career. For established academics the person carrying out this mentoring function need no longer be a senior colleague; indeed, the most effective mentoring I'm receiving in the twilight of my career comes from younger colleagues.

The priority list is trivially simple in format but dreadfully difficult in execution. It has 4 elements:

- List 1: Things I'm doing that I want to *quit*. List 1a: Things I've just been asked to do that I don't want to do.
- List 2: Things I'm not doing that I want to *start*.
- List 3: Things I want to *keep doing*.
- List 4: How I plan to shorten List 1 and lengthen List 2 over the next 6 months.

Note that the entries on this list are about *doing* (things like research, clinical practice, teaching, writing, and the like) not about *having* (things like space, titles, rank or income). Note, too, that there are no "cop-out" entries for "things I *have* to do" (they must be thought through until they can be allocated either to List 1 of things I want to quit or List 3 of things I want to keep doing).

Generating Lists 1 and 3 can benefit from review-

ing one's schedule for the past weeks or months and List 1a from recalled messages and conversations with bosses or colleagues who were attempting to make their problems your problems. List 2 is derived from multiple sources: the logical next research question suggested by the answer to the last one; ideas that pop up in patient encounters, while reading or during conversations or trips to meetings and other research centres; long-held aspirations that are now within reach; changes in personal goals or personal relationships, etc. Reviewing the length and content of List 3 enables self-diagnosis and insight. If long, is it comfortable but complacent, stifling further growth? Worse yet, is it the list of an expert, comprising the tasks required to protect and extend personal "turf" in ways that lead to the "sins of expertness?"[15]

It then becomes necessary to titrate Lists 2 and 3 versus List 1. The failure to stop doing enough old things in order to free up time for doing new things is a recipe for both academic and personal disaster. Not only does the time-imbalanced academic risk acquiring the deadly label of a "non-finisher," clinician-scientists experience increasing dissatisfaction with both their professional and personal lives. The ultimate objective here is to construct lists that, if realized, would lead to a set of research, teaching and clinical activities that would make it fun to go to work.

All the foregoing leads to List 4, identifying the strategies and tactics for achieving the next phase in career development. It adds greatly to one's academic reputation when this list promotes change through evolution (giving 6-months' notice and helping find a successor) rather than revolution (resigning and running away). Furthermore, one can gain administrative skills by sorting out which tasks can be delegated to assistants, with what degrees of supervision.

Just as troubled families are said to achieve 80% of the benefits of family therapy (acknowledging problems, becoming ready to explore and adopt solutions, and the like) before they sit down with a therapist, the majority of the benefit derived from the periodic priority list occurs before it is presented and discussed with one's mentor. Nonetheless, additional insights come with presenting these lists to someone else, and suggestions of additional strategies for change (e.g., learning how to say "no" nicely) usually arise following this presentation. As before, the ability to discuss gender-specific issues in balancing priorities with an informed, empathic mentor is essential. Moreover, because the period of greatest academic dependency for many aspiring clinician-scientists coincides with the period of greatest physical and emotional dependency of their children and partners, the discussion of lists with the former must incorporate the needs of the latter. The suggestions that emerge from these discussions often focus on the effective and efficient use of time, which leads us to the third determinant of academic success: time management.

Time management

The most important element of time management for academic success is setting aside and ruthlessly protecting time that is spent *writing for publication*. I've encountered several successful academics whose only control over their schedule has been protected writing time. Conversely, I've met very few academics who succeeded without protecting their writing time, regardless of how well they controlled the other elements of their schedules. For some academics this protected writing time occurs outside "normal" working hours, but the price of such nocturnal and weekend toil is often paid for by family, friends and fun. Prototypically successful academics set aside 1 day a week (except during periods of intensive clinical responsibilities; *vide infra*) for this activity, and clearly mean it by telling everyone that they aren't available for chats, phone calls, committees, classes or departmental meetings that day.

I've never admired the publications of any academic who told me writing was easy for her or him; those whose work I admire tell me they find it very difficult to write (although many find it nonetheless enormously enjoyable and gratifying). Given the difficulty of writing well, no wonder so many academics find other things to do when they should be writing for publication. The great enemy here is procrastination, and rigorous self-imposed rules are needed for this protected writing time: it is not for writing grants, not for refereeing manuscripts from other academics (aren't they already ahead of you with their writing?), not for answering electronic or snail mail, not for keeping up with the literature, not for responding to non-emergencies that can wait

until day's end, not for making lists of what should be written about in the future, not for merely outlining a paper, and not for coffee-breaks with colleagues. Early on, self-imposed daily quotas of intelligible prose may be necessary, and these should be set at realistic and achievable levels (as small as 300 coherent words for beginners).

It is imperative that no interruptions occur on writing days. Unless protected by a ruthless secretary and respected by garrulous colleagues, this often can best be achieved by creating a "writing room" away from the office; whether this is elsewhere in the building or at home depends on distractions (including family obligations) at these other sites (for a time I simply traded offices with a colleague who wrote the same day as I). Writing in a separate, designated room not only permits the creation of stacks of drafts, references and the other organized litter that accompanies writing for publication, it also avoids the unanswered mail, the unrefereed manuscripts, the undictated patient charts and the other distracting, disorganized litter of a principal office. Moreover, if email is disabled in the computer in the writing office, a major cause for procrastination is avoided.

Mondays hold 3 distinct advantages as writing days. First, the things that "can't wait" are much more likely to arise on Fridays, and very few things that arise over the week-end can't wait until Monday night or Tuesday. Second, a draft that gets off to a good start on Monday often can be completed during brief bits of free time over the next 4 days and sent out for comments by week's end. Third, the comforting knowledge on a Sunday night that Monday will be protected for writing can go far to improving and maintaining the mental health, family function and satisfaction of aspiring academics. And, of course, the more colleagues who write on the same day each week, the greater the opportunity for trading offices and the lesser the conflicts in scheduling meetings on other days in the week.

The second important element of time management requires scheduling clinical activities so that the academics maximize the delivery of high-quality care and high-quality clinical teaching while augmenting (through provoking research questions to be asked and providing patients who might be willing to help answer them), or at least minimizing conflicts with, the other elements of an academic career. I reckon this is best accomplished in inpatient disciplines by devoting specific blocks (of, say, 1 month) of "on-service" time to nothing but clinical service and teaching. When on-service, total attention is paid to the needs of patients and clinical learners, and no time is spent writing, travelling, attending meetings or teaching nonclinical topics. This total devotion to clinical activities often permits taking on a greater than usual number of patients and clinical learners (on my medical inpatient service at Oxford I was on call every third day, my clinical team of up to 16 learners and visitors admitted 230 patients per month, and in addition to our individual daily bedside rounds my Fellows and I provided 13 hours of clinical teaching each week). When off-service" one's time and attention shifts as completely as possible to research and nonclinical teaching. Ideally there is no time spent "on-call" when off-service, nor should off-service time be devoted to post-hospital outpatient follow-up unless it's truly clinically indicated (again on my service, post-admission and pre-discharge telephone conversations with thepatients'GPs reduced outpatient follow-up to less than 5% of admissions). Academic clinicians who fear getting rusty or out of date between their months on-service can precede them by shadowing a colleague for a week or so prior to reassuming command (I alternated between the coronary care and intensive care units for my "warm-up" weeks). Like so many other elements of academic success, time management is fostered by the development of a team of like-minded individuals who spell one another in providing excellent clinical care.

Clinicians in other fields (e.g., intensive care and many of the surgical specialties) sometimes find it preferable to allocate time to clinical practice and research in units of 1 week. Another variant of this approach is that of 2 former residents on my team whose current incomes are derived solely from private practice. They devote 3 weeks each month to intensive clinical practice in order to free up the fourth for their highly successful applied research programs.

This still leaves the outpatient dilemma. Academic clinicians usually accept ambulatory referrals to their general or subspecialty clinics 1 or 2 half-days every week. In addition to the time spent during the clinic session itself, several hours are spent during the fol-

lowing 2 to 3 days chasing down "lab" results, talking with referring clinicians and dictating notes. I submit that this pattern of practice by academic clinicians who are (and should be) frequently out of town as visiting professors, presenters and grant reviewers risks lowering the quality of their outpatient care; what happens when they are 1000 km away from one of their outpatients who gets sick during a work-up or has an adverse reaction after starting a new treatment regimen? Moreover, the aforementioned interruptions of other academic activities in the 2 to 3 days following an outpatient session threaten both research productivity and peace of mind. A solution worth considering is to stop holding outpatient sessions every week and concentrate them into back-to-back-to-back clinics just once a month. By staying in town for the few days following this outpatient "blitz," a month of clinics' loose ends get tied up all at once (especially if chasing down lab results can be delegated) and the remainder of the month is free for academic activities.

My final remarks concern spending time going to annual scientific and clinical meetings. Such meetings usually are fun and relaxing, often are educational (especially, as noted above, when attended in a group of mentors and mentored) and sometimes offer the chance to meet or at least observe the ephemeral experts in the field. But the opportunity costs of attending meetings are measured in time away from teaching, patients and especially writing, and I know lots of academically successful clinician-scientists who seldom or never go to meetings (which shows us that attending them is not a prerequisite for academic success). As with the other elements of time management, self-discipline is required, and the adoption of rules such as the following may be useful:

1. Never go to an annual meeting for the first time unless you have submitted an abstract that will get published in a journal (thus inaugurating your curriculum vitae).
2. Never go to that meeting a second time until you have a full paper based on that abstract in print or in press (thus making a major contribution to your curriculum vitae and academic recognition).
3. Thereafter, only go to that meeting if *both* Rule 2 has been met *and* this year's abstract has been selected for oral presentation (or you have been invited to give the keynote lecture).

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