I was one of those students who was not particularly interested in the basic science courses in medical school, but instead was eager to get on to more direct patient care and clinical experiences. For example, if you were to ask me now about even the basics of the Krebs cycle, I would fail, having not drawn upon this biochemical pathway for some decades. However, one concept that I have found to be of recurring value is the Starling curve. Strictly speaking, this is the physiological principle that increased filling of the heart leads to increased cardiac output but, after a critical volume is reached, decompensation occurs and output declines. The Starling curve, however, transcends medicine. What is true of the heart applies to many other things in life. Mies van de Rohe coined a tenet of modern architecture—“less is more”. The Starling curve describes a critical threshold where this rule is reversed, and “more is less”.

One Too Many Syndrome

The irony of the Starling curve is that there is a very fine line distinguishing optimal filling pressure from diastolic dysfunction. A busy waiting room characterizes a successful practice. Multiple grants define a fully funded investigator. Numerous and interesting patients are required to provide a valuable learning experience for residents and students. There comes a point, however, when there are too many patients scheduled, one too many projects, one too many admissions; or, one too many unwritten papers, one too many committee meetings, one too many hats to wear. In short, the proverbial straw that breaks the camel’s back. Most of us have played the children’s game of stacking blocks, anxiously waiting to see if the next block will topple the pyramid, holding our breath because of the tenuous balance. For each of us, the ascent up the slope may be gradual but we find ourselves on a precipitous cliff. While preload accumulates imperceptibly, pulmonary edema has an abrupt onset.

Signs and Symptoms

There are clues that the downslope of the curve is approaching or upon us. Irritability is one. For example, resenting the patient we are about to interview or examine, impatience with the learner, frustration about the e-mail avalanche following a day or two of not checking our inbox, a short fuse with our office staff, colleagues, or family.

Feeling overwhelmed is a more advanced symptom. Shifting from one stack of papers on our desk to another, randomly chipping away at unfinished tasks. Forgetting where we put our notes from rounds, or that form we need to complete, or what it was we had started to do. House staff who are on-call can experience this in the waning hours before dawn as they vacillate between finding the x-rays, completing write-ups, starting IVs, or checking up on earlier admissions. Prioritizing becomes more difficult. An orderly sequence of task completion gives way to a desultory pattern of starting and stopping. Or not knowing where to begin. Researchers may experience this in the last days before a grant deadline. That desperate undergraduate feeling of final exams.

An even later symptom is ennui. What once provided joy and satisfaction becomes tedious. Attending rounds are a duty. Getting a grant funded is a mixed blessing. Invitations to serve in a leadership capacity feel more like a burden than a privilege. Burnout is a term commonly applied to the terminal stages.

There are other signs, such as the following:

- Overscheduling so that you are always 5 to 10 minutes late for the next person waiting to meet with you;
- Interrupting conversations with the person in your office to answer a page or make a quick phone call;
- Promising to review a paper or grant for a colleague but doing so with either an unreasonable delay or a hurried almost token effort;
- Agreeing to one too many invitations for lectures or teaching assignments with the result being old slides, minimal updating, and scanty preparation; and,
- Chronically delinquent in completing student evaluations, in submitting research progress reports, in signing medical records—and needing repeated reminders.

continued on page 2
Etiology
Why is there a tendency to skate so near the edge? Don’t forget that a large portion of the Starling curve is a good thing. We like to be productive. We want to maximize our potential as physicians, teachers, and investigators. Training is long, life is short, and the time to make substantial contributions seems evanescent. This is true of our personal life as well. Kids grow up too fast. The number of books we desire to read always exceeds our grasp. Additional time for recreation, community involvement, and personal restoration are asymptotic goals, always just beyond our reach. Thus, the Starling curve is not simply optimizing our achievements in one particular sphere but rather maximizing the “area under the curve” in all domains of our life. It is that utopian vision of personal-professional balance.

There are other factors. We hate to say “no.” We are honored to be asked. We know how hard it is for those making the request to find someone else (we have been in their position). We are pressured to say “yes”—by patients, collaborators, department chairs, professional organizations. Being overly busy is worn as a badge of importance. Free time can make that Type A portion of our personality feel guilty or unproductive.

Prevention
To reiterate, a large portion of the Starling curve is good. It is that last 10-20% we need to avoid, the extra gasp of air that bursts the balloon. Many of the ways we might avoid the downslope of the curve have already been alluded to. Recognizing the signs and symptoms and understanding the etiology are cornerstones of prevention. I would like to conclude with three other strategies. One is accommodation. The gradual accretion of tasks and responsibilities is better tolerated than sudden overload. Muscles can strengthen over time rather than suffer acute injury. If we must say “yes” to multiple competing demands, sequential acceptance is better than simultaneous acquiescence. A second strategy is substitution. Even with accommodation, only so many balls can be juggled in the air before one is mishandled or dropped entirely. Deciding what to relinquish and when is a lifelong process and a skill that we should impart to all professionals. A third strategy is the ability to accept boundaries. Eternity and infinity are intoxicating concepts. While rationally we understand our temporal and finite nature, we are enticed by the urgings of “one more”. Whenever we have achieved “N” in some important area of our life, it is tempting to desire “N + 1.” Preempting this process of inexhaustible addition demonstrates good stewardship of our Starling curve.

Starling curves are like snowflakes; there are as many sizes and shapes as there are individuals in the world. Managing our own curve is a highly personal and idiosyncratic process. The only universal characteristic is that every curve has an elbow. Recognizing that juncture and stopping just short is both the greatest challenge and the ultimate reward of our vocation. It is what makes our job a calling.
A recurring privilege for an SGIM President is writing a monthly column for the Forum newsletter during the one-year tenure in office. My February 2002 column was entitled “Starling Curves” and, 15 years later, I have been asked to reflect on this column in terms of personal and societal lessons learned over time. Most striking is the correspondence between a largely personal metaphor in 2002 and the subsequent outpouring of research on physician burnout. A recent systematic review of interventions for physician burnout found 52 studies (15 randomized trials and 37 cohort studies) all but one of which have been published since 2002.

Burnout was first described in 1974, and is characterized by three dimensions: emotional exhaustion from overwhelming work demands, depersonalization (e.g., impersonal response toward patients or coworkers), and a perceived lack of personal accomplishment. About one-third to one-half of physicians experience burnout, irrespective of country or specialty. Physician job demands, low organizational commitment, and high work stress are important root causes of burnout. Adverse consequences include low job satisfaction, depression, and decreased patient satisfaction and quality of care. Burnout is also associated with intentions to leave practice or retire early. Among hospitalists who met criteria for burnout, 44% indicated they intended to leave hospitalist practice within four years.

Is burnout simply another term for depression, a disorder which is also disproportionately increased among physicians? While acknowledging burnout as an important risk factor for depression, Epstein and Privitera argue that they are not synonymous in that “Burnout is conceptualized as a breakdown in the relationship between people and their work. That burnout has worsened acutely in the context of radical changes in the nature of clinical work—electronic health records that reduce face-to-face time and documentation mandates that have exponentially increased the burden of meaningless tasks—speaks against a purely individual syndrome.” Physicians are often required to report any mental illness when applying for a medical license and hospital privileges, and may be more willing to accept they are burned out and seek help for a less stigmatizing, more systemic and institutional problem. In March 2016, the US Surgeon General declared that burnout among health-care workers was one of the two most pressing health problems in the nation to be addressed during the subsequent year.

An explosion of technology since 2002 may also fuel burnout. Intended to improve patient care, the electronic health record (EHR) and computerized physician order entry (CPOE) can increase physician workload including extra hours of clerical work. In 2008, less than 15% of medical practices used EHRs and less than 5% had fully functional EHRs that incorporated test ordering, electronic prescribing, decision support tools, and medical images. By 2012, these proportions had increased to 72% and 40%. Physicians who use EHRs or CPOE are less satisfied with the amount of time spent on clerical tasks and more susceptible to burnout.

Additionally, the proliferation of e-mail, texting, and other social media has enhanced communication at the cost of added work time and 24-7 availability. Fralick and Flegel note that “When the workday ends at Volkswagen, so does an employee’s access to company email. Atos, an information technology company with more than 80,000 employees, is going one step further. It is eliminating company email. The Bank of Montreal, following the lead of Goldman Sachs Group Inc., is insisting that its junior bankers take weekends off. Businesses have realized the unintended consequence of their employees always being reachable: burnout.”

In 2002, I shared some personal reflections on how to avoid the descending slope of the Starling curve, since which time research has suggested some evidence-based approaches. These include individualized (mindfulness-based and other approaches to stress reduction, personal coaching, boundary setting) and organizational (e.g., patient-centered medical home models and/or scribes) strategies. Along the way, some trade-offs may be necessary. For example, a trial comparing two-week vs. four-week inpatient attending rotations found the shorter rotation was associated continued on page 4
with lower attending burnout but worse evaluations by trainees. 

A second column of mine for the Forum in May 2001 was on a companion topic—“Vacations”—where I wrote that “I worry about too little vacation in our lives—both at a macro (days or weeks) as well as a micro (hours in a day) level.” I suggested several screening questions:

- Do you feel satisfaction in being the first at the office in the mornings, the last to leave, or the only one there on the weekend?
- Conversely, do you feel guilty when, heading for the elevator at 4:00 pm, you are sighted by a co-worker who exclaims: “Leaving early today?”
- How do you feel when an e-mail from a colleague is sent at 3:00 am? Do you feel better if you are the nocturnal sender rather than the sleeping recipient?
- Is your laptop computer as essential to your vacations as your luggage?
- Do you schedule catch-up days after being away, or is the aftermath of a vacation a pressured week of double and triple booking?

Disturbingly, a study several years ago indicated that the United States was near the top of hours worked per week among developed countries, second only to Japan. The United States seems to be correspondingly parsimonious in terms of vacation days, sick days, familial leave (maternity, paternity, other) and other types of paid time off.

A final strategy I have found helpful is the A/B/C pie chart of prioritizing work. As are those tasks you love to do, Bs are those you like to do, and Cs are those you have to do to fill out your “time card.” I advise junior colleagues that a 50/30/20 distribution is not bad, and that whatever can be done to maximize the As and minimize the Cs is likely to optimize work satisfaction and diminish burnout. While the As, Bs, and Cs inevitably change over the course of a career, personally grading your tasks and prioritizing accordingly is one way to maintain a functional rather than decompensated Starling curve.

References