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Sustaining a career in surgery

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ABSTRACT

Surgery is a demanding career with great rewards and equally great challenges. In order to sustain our careers as well as the careers of our colleagues, it is important to understand and address the physical, psychological and spiritual challenges of surgery. With rare exception, the majority of surgery residents and practicing surgeons who prematurely leave surgery do so because they find the work to be physically, emotionally or spiritually incompatible with the vision they have for their life. Understanding these issues and providing solutions to improve surgeon wellness can help prevent societal loss of these highly trained professionals and suffering for surgeons and their families.

"In the classic training program, we have taught how to perform surgery, but we have not taught how to live as a surgeon." D. Campbell[1]

Although many surgeons truly love their work, it is telling that when asked, 60% of surgeons would retire if they could, and 12.5% plan to retire in the next two years.[2,3] The average age for leaving the practice of surgery is less than the expected age of 65 and has been reported to be as low as 57.[4] Although some surgeons leave early due to illness or other events that are not in their control, many surgeons leave voluntarily. This exodus of practicing surgeons is a loss to society, particularly given the significant shortage of general surgeons in the United States.[5] It also reflects tremendous personal loss since the most common cited reason for early retirement is burnout.

The loss of surgeons from the workforce begins during training. The attrition rate from General Surgery residencies varies between 2% and 26%, and averages 18%.[6] The most common reason residents give for leaving a program is "uncontrollable lifestyle."[6] There is a significant gender difference in attrition, with 25% of women and 15% of men leaving surgery programs. This disproportionate attrition rate for women is attributed to perceived gender discrimination, the presence of sexual harassment, and lack of female role models.[6] Lack of support for resident well-being also contributes to the attrition rate. In a recent study, 78% of residents stated that resident well-being was important to their program director. However, only 40% felt the attending surgeons were concerned about resident well-being.[7] Losing almost 1 in 5 surgical residents during training is not only a loss for the programs and for society, but also represents emotional turmoil and loss of years for these residents. These attrition rates, and the perceived lack of support for surgeon well-being also contributes to medical student perception that surgery is a high distress career.[8,9] All surgeons, but particularly surgeons working with residents, need education and resources to support and improve their own well-being as well as the well-being of their trainees.[4,7,10]

1. Physical well being

Some illnesses that limit a surgical career are unexpected and not preventable, but others are easily detected and effectively treated with appropriate use of health care services. 7% of surgeons less than 40 years of age have a major health issue, a number that increases to 50% for surgeons over 50 years of age.[11,12] It is interesting to speculate how many of these health issues could have been avoided or improved with routine medical care, since 25% of surgeons over 50 have failed to schedule a screening colonoscopy, cardiac exam, and, for the men, a prostate examination.[11] This pattern starts during residency; in a recent study of surgical residents, 56% did not have a primary care provider, 37% had not seen a dentist in 2 years and 29% did not have a current prescription for glasses or contacts.[7]

Occupational injury occurs frequently in surgeons but is poorly documented and studied since these injuries and illnesses are not tracked. The potential causes of occupational injury for surgeons include blood borne pathogens, exposure to surgical smoke and radiation, topical allergies and ergonomic related musculoskeletal

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injury. These hazards are rarely discussed among practicing surgeons or taught in surgical training, a fact that is disturbing since a significant percentage of these potentially career limiting issues are preventable and, when identified, successfully treated.

Due to regulations covering universal precautions and reporting of needle sticks, most surgeons are familiar with the risk of the three most common blood borne pathogens, HIV, Hepatitis B and Hepatitis C.[13] The risk of transmission of Hepatitis B with a needle stick, particularly a hollow needle, is significant and has been reported to be as high as 60% if the patient has high rates of viral replication.[14–17] Therefore, it is important that surgeons and surgical trainees know their Hepatitis B vaccination status and insure they are adequately vaccinated. The risk of transmission of HIV from a sharps injury is estimated to be 0.3%.[13,15] The risk of transmission of Hepatitis C with a needle injury is 0.5–3%.[14,15] Since there currently are no available vaccines for HIV or Hepatitis C, using appropriate precautions in the operating room and reporting all exposures are essential to control the risk of these life or career limiting illnesses. Post-exposure treatments are available for HIV, Hepatitis B and Hepatitis C with marked reduction in infection when prescribed.[17,18] However, this can only occur if the needle stick is reported and appropriate labs are drawn.[15] Despite this, surgeons often do not report sharps injuries. In one study, only 10% of surgeons followed the accepted protocol after incurring a sharps injury.[14]

Surgical smoke results when tissue is exposed to cautery, ultrasonic instruments, argon beam or lasers.[19] Surgical smoke contains 18 volatile compounds, five of which are considered carcinogenic. For two of these compounds, 1,2-dichloroethane and benzene, the quantity present in surgical smoke has been classified as unacceptable.[20] Other than possible transmission of human papilloma virus with fulguration of lesions, there are no reports of surgeons with diseases directly attributable to surgical smoke. But this does not obviate the fact that surgical smoke should be considered to be as mutagenic as cigarette smoke.[13,21] This is a potential exposure that is poorly addressed in most institutions; only 3% of surgeons report that equipment to evacuate smoke is available in their operating rooms.[13,20]

Surgeons who use fluoroscopy in the operating room are exposed to ionizing radiation with an associated risk of thyroid cancer, cataracts and other cancers.[22] Although most studies have shown that surgeons in routine practice do not approach the annual acceptable limit for total body exposure, there are specialties that are at higher risk. For example, population based data suggests that the incidence of brain tumors in interventional cardiologists and breast cancer in female orthopedic surgeons is higher than population controls.[13,22,23] Because there is no completely "safe" level for radiation, precautions should be taken to limit exposure in all cases. Lead aprons, thyroid shields and in some cases, protective eyewear, should be worn when using fluoroscopy. Tapping the foot pedal during fluoroscopy, rather than holding it down, will limit exposure for the surgical team.[24] Understanding the physics of radiation is helpful to limit exposure as well. For example, radiation exposure for the surgeon is higher on the emitting (generator) side of the fluoroscope than the receiving side (intensifier) due to scatter from the patient's body, especially in patients with a high BMI.[13,24] Surgeons who stand on the "receiving" (intensifier) side of the fluoroscope experience a 6 fold reduction in radiation exposure. Doubling the distance from the radiation source leads to a fourfold decrease in exposure.[24] To limit exposure, the entire surgical team should stand 6 feet (2 m) away from the radiation source when possible, since at this distance the amount of radiation is essentially undetectable.[13,24,25] Because of the known risk of cataracts, dry eye condition, radiation retinopathy and thyroid cancer it is particularly important to insure that exposure to the surgeon's head and neck is limited through the use of thyroid shields, position of the radiation source and, when appropriate, protective eyewear.[22,26] Head and neck exposure is higher for shorter surgeons, and will also change dramatically based on the angle of the C-arm.[27]

Exposure to topical allergens does not result in life-threatening conditions, but dermatitis related to gloves and/or disinfectants can significantly limit a surgeon's ability to practice surgery. In one study of physicians who graduated from a Japanese medical school, 25% developed contact dermatitis from gloves and/or disinfectants. The risk factors identified for contact dermatitis were a past history of allergies and being a surgeon.[28] Clorhexidine is a particularly problematic allergen, with 2% of health care workers reporting contact dermatitis to chlorhexadine.[29] The incidence of clorhexidine allergy is increasing in the general population, and can present as contact dermatitis, reactive airway disease or even anaphyaxis.[30]

> *"Sadly, a surgeon can much more easily obtain a detailed ergonomic assessment and direction for improvement of his or her golf swing than of his or her surgical "stance" or movement." A. Park*[31]

Performing surgery is physical work and therefore has associated specific work-related injuries.[32] In general, the factors that increase the risk of musculoskeletal injury are awkward body posture, frequent repetitive movement of the upper extremities, and prolonged static position.[33–35] The focus required during surgery results in particularly long periods of time in a static position, greater than that seen in most other professions.[35] There are also numerous design issues that contribute to the ergonomic stresses of surgery. Primary among them is that operating room design has not significant changed in the last 50 years.[36] Most operating room tables were designed for open procedures. They are adjustable between 72.5 and 121.5 cm, and therefore do not go low enough for an ergonomically appropriate position for minimally invasive procedures, particularly if the patient is obese.[32,33,35,37] In one study looking at the interaction between table height and instrument handle design in minimally invasive surgery, table height was ergonomically limiting for 95% of surgeons.[32] The instruments and monitors used for minimally invasive surgery can also be problematic as they were initially modified from instruments used by otolaryngology.[31] For example, the traditional "tower" configuration of monitors used in otolaryngology is a significant ergonomic issue for minimally invasive surgeons since the screen should always be in front of the surgeon and not to the side. The ergonomically optimal position for monitors is 10–25° below eye level directly in front of the surgeon, which cannot be achieved if the screen is on a tower. Not being able to move the monitors to this position increases the risk of neck injury.[31,32,38] The handles for instruments used in minimally invasive surgery come in only one size, compared with eight sizes of surgical gloves, a fact that creates issues for surgeons with smaller hands (glove size $\leq$ 6.5).[31–33,38,39] In addition to being an awkward size for many surgeons, instrument handles often require non-ergonomic motion, particularly for surgeons with smaller hands.[37] Finally, because of length and other design requirements for laparoscopic instruments, 4–6 times more force is required to use these instruments when compared to instruments used in open surgery.[33] The lack of smaller instruments and this need for increased force for places women at particular risk for instrument related ergonomic injury.[32] Solving these ergonomic design issues requires collaboration between manufacturing companies, engineers and surgeons, a process that is now underway.

How surgeons position themselves for surgery is the result of how they were trained, personal preference and a need to maintain technical efficiency - even if this results in injury to their

musculoskeletal system.[32,40] Surgeons tend to "work through" the pain if and when it occurs since this what they saw their mentors do. Musculoskeletal pain during and after procedures is common, with 50–85% of surgeons reporting pain and 40% reporting an actual injury.[6,41–43] Most surgeons do not realize that the presence of pain is not normal and is an indication that injury has occurred. It is the chronic repetition of these small "injuries" that results in more significant and career limiting injuries.[14] Very few hospitals or training programs teach the basic principles of ergonomics to surgeons and surgical trainees. In one survey only 11% of surgeons had rudimentary knowledge about ergonomics.[44] Understanding ergonomic principles and specific ergonomic stresses can lead to better ergonomic positions and less pain. For example, open surgery is particularly hard on the neck and lower back, with an average of 54% of time in a "head forward" position and 27% of time in a twisted posture.[33,45] The risk of cervical injury from the "head forward' position is made worse by the use of a headlight and loupes as this increases cervical loading by 40%.[46] Likewise, the use of lead aprons during fluoroscopy increases the load on the lumbar spine which increases the risk of injury.[43] Although headlights, loupes and lead aprons are all important tools for the surgeon, this suggests that limiting their use when possible is advisable. In addition to neck injury, minimally invasive surgery can also result in injury to the shoulders and hands.[31,45] Over 75% of minimally invasive surgeons experience musculoskeletal symptoms during and/or after operating.[31–33,42,44] Interestingly, age is not a predictor for the onset of musculoskeletal symptoms for minimally invasive surgeons, although symptoms do increase with age.[41,46,47]

The ergonomic stresses of surgery can be ameliorated if the principles of ergonomics are understood. For example, to prevent a prolonged static position, surgeons can ask the anesthesiologist to intermittently rotate, raise or lower the table by a trivial amount during a long case.[31] Even these small changes will result in a change in the static position for the surgeon. Surgeons should also learn to periodically do "posture resets" for themselves and their team to insure no one has a forward head posture, raised shoulders, clenched hands or an asymmetric stance.[44] Putting disproportional weight on one foot, resulting in an asymmetric stance, can lead to hip and back injury. To prevent this, surgeons should periodically consciously adjust their stance or place one foot on a stool, a maneuver which balances the pelvis.[44] Foot pedals should be avoided in favor of handheld devices to avoid an asymmetric pelvis. If this is not possible, at a minimum the foot pedal should be pointed at the "target organ", in line with the surgeon's eyes to avoid an awkward stance.[44] It is also very helpful to step back from the table and stretch from time to time.[44] Since overall focus has been shown to improve with intermittent breaks during high intensity work, these "mini-breaks" may serve several purposes.[13]

Exercise plays a particularly important role in the prevention and treatment of musculoskeletal pain from ergonomic injury.[46] Of all forms of exercise, strength training has the most improvement in musculoskeletal pain in the first two months of exercise, continues to improve with continued exercise, and persists over time.[48,49] Yoga, Tai Chi and Pilates may be a particularly good exercises for surgeons since they require core strength through rotational movement. Although there are no specific data for surgeons, dentists who practice yoga have an 11% incidence of musculoskeletal pain compared to 22% of dentists who exercise and 45% of dentists who do no physical exercise.[50] Most surgeons who develop workplace injuries that result in limitations do not realize they are eligible for medical care, rehabilitation and, if disabled, workman's compensation. In order to be eligible for these benefits, however, the injury must be reported. This is problematic, since 30% of surgeons do not know how to report the injury and less than 20% of injuries are reported.[51,52]

Physical well being for surgeons goes beyond prevention of occupational injury. In addition to regular appointments with a physician, regular dental appointments, and age-appropriate health screening, physical well-being also includes a planned and consistent focus on exercise, sleep and eating well. The role of exercise in maintenance of health cannot be over emphasized.[53] However, in several surveys of US surgeons, only 50% met the CDC guidelines for aerobic exercise and only 33% met the requirements for resistance (weight) training.[51,54] This is a particularly telling statistic given the role of weight training in preventing musculoskeletal injury and treating musculoskeletal pain.

Sleep deprivation and chronic sleep restriction are major contributors to poor health and loss of well-being.[55] For surgeons who take call and experience sleep deprivation, the issue is not only loss of sleep, but an inability to "catch up" on lost sleep.[53] Adults require 8 h of sleep a night, with only a small percentage who do well with 7 h of sleep.[56] However, 60% of surgeons reported an average of less than 6 h of sleep per night, resulting in chronic sleep restriction.[51] Studies have demonstrated that sleep deprivation in surgeons is not associated with an increase in adverse outcomes.[57,58] However, it is well known that both sleep deprivation and chronic sleep restriction result in slowing of motor skills, increased lapses in attention and deficits in working memory.[59] There is little question that the outcome for a specific case could be adversely affected by lack of sleep, particularly in an emergency situation.[60] Prolonged sleep deprivation is particularly dangerous since being awake for 17 h results in function that is equivalent to a blood alcohol level of 0.05.[61] This increases to the equivalent of a blood alcohol level of 0.08 after 21 h.[61] There is also evidence that combining sleep deprivation with being awake at the trough of the circadian cycle (midnight to dawn) is additive, data to consider when creating call schedules.[62] Being on call and working the next day was the norm for previous generations, but based on these data this schedule may not lead to optimal patient care. The use of caffeine to counteract sleep deprivation may also be problematic, since increasing amounts of caffeine can negatively affect surgical performance.[63]

Optimal performance during demanding mental or physical activities requires adequate and appropriate nutrition, which is problematic in most hospital settings.[64,65] In addition to providing energy to work, good food also improves a sense of well-being. In one study of surgical residents, lack of good nutrition at work correlated with both lower well-being scores and burnout.[66] Healthy eating in the hospital is a significant problem at night, with only 19% of physicians reporting that their nutritional needs are adequately met when on call.[66] Having access to healthy food, and being able to eat it on a regular basis has the potential to improve patient care. In a study of physicians, after obtaining baseline control data, study participants ate small meals or snacks on a regular schedule during the workday. Cognitive function for both simple and complex tasks improved for every measure tested during the intervention day when compared to the baseline day.[65] In other words, eating small healthy meals or snacks on a regular basis has a direct impact on a physician's ability to think, react and, therefore, take care of patients. For most physicians, this means planning and bringing food from home until more options are made available in the hospital.[65]

> *"[Surgeons] share an unwritten but understood code of rules, norms, and expectations. This code includes coming in early and staying late, working nights and weekends, performing a high volume of procedures, meeting multiple simultaneous deadlines,*

never complaining, and keeping emotions or personal problems from interfering with work. These are hallmarks of dedicated professionals that should be celebrated and rewarded. However, there is a fine line separating dedication from overwork; if unchecked, overwork could lead to counterproductive, unhealthy, or even self-destructive behavior that may affect patient care." CM Balch[67]

2. Emotional well being

Practicing surgery is not easy, and most who choose to be surgeons know and embrace this fact. The act of operating on another human being is stressful, and requires psychological fortitude as well as skill. As a result, the surgeon-patient relationship is unique, and results in deep and special bonds with patients.[1,68] The surgeon-patient bond is accompanied by a strong, culturally reinforced sense of responsibility.[1,69] The unspoken implication is that surgeons are responsible for all that happens after a procedure and therefore should be available at all times. Unfortunately, as a result, those who seek time to rest or are suffering for any reason (physical, psychological or spiritual) often feel that they are somehow "less".[70] Additional stressors for practicing surgeons include medical errors, adverse outcomes and malpractice lawsuits, all of which are associated with an increased risk of burnout, depression and suicidality.[71] In these situations, the surgeon inevitably becomes a "second victim" as a result of emotional trauma.[1] This trauma adversely affects the ability to work, particularly in the areas of memory, recall of knowledge, and attention.[72] Becoming a "second victim" is not an uncommon situation. All physicians experience errors and adverse outcomes. 42% of all US physicians will be sued during their career, a number that increases to 90% for surgeons.[71]

Depression is common in physicians, with 12.8% of male and 19.5% of female physicians experiencing clinical depression during their lifetimes.[67] The stigma of mental health in our society extends to physicians, unfortunately delaying treatment for many. In addition, physicians often perceive treatment for mental illness as leading to "punishment" by medical boards and other institutions. As a result, a small percentage of surgeons with depression and only 26% of surgeons with suicidal ideation seek treatment.[73] Sadly, it is often a critical problem in patient care or suicide that brings to light severe depression in a colleague.[4,67] The current epidemic of physician suicide cannot be ignored. Over 400 physicians in the United States die by suicide every year, a number which may be even larger when "unexplained accidents" are included.[74] One in 16 (6.25%) surgeons have experienced suicidal ideation in the previous year, most often related to a perceived medical error, depression and/or burnout. This is almost double the rate of suicidality of the general population.[73] Younger surgeons may be at particular risk since the prevalence of suicides before age 40 is 2–3 times greater than for physicians older than 40.[73,75] Women physicians are at higher risk, with a 130% increased risk of dying by suicide when compared to the population compared to 40% for male physicians.[76] Addiction, with or without associated depression, is almost universally limiting to a surgical career unless it is identified and treated. Almost 1 in 7 (14.7%) of surgeons and surgical trainees meet the criteria for alcohol abuse or dependence with additional 15–30% meeting the criteria for problematic alcohol use.[8,11,77] There is a 75 fold increase in suicide of addicted physicians when compared to the general population.[4] Even if surgeons do not meet criteria for alcohol abuse or dependency, intermittent excessive drinking may have a deleterious effect on their performance; Binge drinking affects the performance of pilots the next day, even when blood alcohol levels are negligible.[63]

3. Burnout

"Burnout" is characterized by a combination of losing enthusiasm for work (emotional exhaustion), viewing and/or treating patients and colleagues as objects (depersonalization) and feeling others could do your job better than you (low personal achievement). Burnout occurs in all specialties, but is particularly prevalent in the surgical specialties with up to 42% of surgeons meeting the criteria for burnout.[54] The incidence of burnout for all physicians has increased over time, which can attributed in part to changes in the delivery of medical care which have increased job stress without increasing job satisfaction.[14] Burnout was first described in the 1970s with subsequent studies that led to validated tools to accurately measure burnout and burnout risk.[78] These include the Maslach burnout inventory (22 questions), the abbreviated Maslach burnout inventory (9 questions), the Copenhagen Burnout Inventory, and the Mayo Clinic Physician Well-being Tool.[66] These tools can be used to compare groups or the outcome of specific interventions for an individual or group. In addition to the cumulative score, the scores for each of the three components of burnout (emotional exhaustion, depersonalization and personal achievement) can lead to additional insights. 45.8% of physicians have abnormal scores in a component of burnout even though their cumulative score are within normal limits.[78] Studies have also shown that the pattern of burnout differs depending on the stage of training. For example, practicing surgeons and faculty members usually have a strong sense of personal achievement even though they are experiencing significant emotional exhaustion and depersonalization, a finding which is not true for students and residents.[78] Unlike burnout, perception of work-life balance is a subjective measure without a clear definition or validated tools. Despite this, it is a subjective measure that is often quoted as a major cause of distress for physicians. Although General Surgery ranks just below average in burnout when compared to other specialties, surgeons report the worst "work-life balance" of all specialties.[79]

All physicians will experience some or all of the components of burnout during their career. The key is to recognize these symptoms when they occurs and intervene quickly and effectively. The first step, which may fly in the face of surgical culture for many surgeons, is to acknowledge this is real, and not a sign of personal failure. Individuals can then experiment with different interventions and strategies for physical, emotional and spiritual self-care.[12,53] It is important to not be isolated; "Human beings heal by telling stories."[80] Having a safe space to "debrief" by sharing the events of the day cannot be overemphasized as a tool in preventing and treating burnout.[10,14,55,80–82] Therefore, protecting and nurturing close relationships at and outside of work is an essential component of physician self-care. This means paying attention to work schedules to insure adequate time for these relationships. Working more than 60–80 h a week and/or taking more than 2 nights of call per week results in an increase in conflict at home and a higher risk of burnout.[83] Mindfulness, other meditation practices and/or religious practices are also effective tools in preventing and treating burnout.[55,70,78,82,84,85] Physicians who practice mindfulness and learn mindful communication show improved overall burnout scores as well as improvement in each of the three domains of burnout (emotional exhaustion, depersonalization and achievement).[78,84]

"Burnout is not a problem of people but of the social environment in which they work." C. Maslach[81]

Many surgeons unfortunately perceive burnout as an individual failure. However, the fact that almost 50% of physicians in the

United States have symptoms of burnout makes it clear that this is as much, or perhaps more, an issue of our current working environments and health care system than individual failure.[74,79,86] Changing the perception that burnout is solely the responsibility of the individual physician is a critical first step in solving this career and life-limiting problem. It is also important to understand the risk factors for burnout to allow individuals and institutions to develop prevention strategies.[67,87] These risk factors include losing a sense of meaning for work, working more than 60 h a week, high patient volume, time constrained patient care, loss of autonomy, increased administrative duties, making a medical error, being sued, sexual harassment, unfair pay, and lack of resources.[12,86,87] Beyond ameliorating the distress of individual physicians, institutions have other important reasons to develop strategies to prevent and treat burnout. Physicians suffering from burnout are associated with a decrease in the quality and quantity of patient care as well as an increased risk of malpractice suits.[8,51,69,78,86] For example, each point increase in the depersonalization score is associated with a 5–11% increase in reports of medical errors.[78,88] In addition, low scores for personal achievement have been shown to correlate with decreased productivity and effectiveness.[78] When hospital Chief Financial Officers were surveyed, they estimated that when a surgeon misses 2 weeks of work, the hospital loses more than $80,000 in revenue.[51] If a surgeon retires early or leaves the institution due to burnout, the financial implication is significant. Replacing a new surgeon can cost as much as $2,000,000 in recruiting fees and lost revenue.[1]

Institutions and residency programs that develop systems to prevent and treat burnout will see a downstream return on that investment through less turn-over, less illness, fewer days off, improved patient care and better patient satisfaction.[70,78,79,88] It has been shown that although individual effort to prevent and treat burnout is important, changes at the institutional level are the most effective method of decreasing physician burnout.[87] (Table 1) In addition to monitoring and adjusting physician schedules, other changes at an institutional level should include education about burnout, and changes to promote good nutrition, exercise and sleep. Health care organizations are becoming increasingly aware of their role in teaching patients and about healthy eating. Unfortunately, this often does not translate into making healthy food available to those caring for patients. Insuring access to good food on a regular basis is in the interest of institutions as it will have a downstream affect in improving patient care.[65] Examples of such a change would be making healthy food available near the operating room or surgeons' lounge.[65] Importantly for many hospital administrators, this food does not have to be provided free of charge since most physicians are willing to pay for high quality, healthy food.[65] Leadership training and counseling for physician-leaders is an important institutional goal as the most important contributing factor to physician burnout is physician perception of how effective their leaders are. In a study from the Mayo Clinic, 11% of the variation in burnout and 47% of the variation in satisfaction with the organization was explained by the leadership rating of the division/department chairperson.[89] Other institutional changes that can lead to a decreased risk of burnout include annual screening for burnout, designing methods to increase autonomy for individual physicians, showing gratitude for work, increasing transparency to demonstrate fairness in all decisions, and reducing workload through careful scheduling and planning.[78,87] Attention to unintended consequences of compensation plans is also important. For example, bonus plans that disproportionally reimburse work above an expected baseline may have the unintended consequence of increasing hours worked, at the expense of time for personal needs.[83] Creating call schedules to promote wellbeing is an important institutional responsibility since more than 2 nights of call per week has been shown to correlate with a markedly increased risk of burnout.[83]

Our goal as a profession should to be identify personal or career

Table 1
Institutional strategies to promote surgeon well-being.

General
- Enforce policies to prevent discrimination and sexual harassment in training programs and the workplace
- Develop effective mentorship programs for surgeons and surgical trainees
- Provide annual or semi-annual assessment of burnout for surgeons and trainees
- Establish programs to provide counseling and individualized interventions for physicians experiencing burnout
- Provide training and counseling to promote effective and fair division and department leaders
- Monitor physician “clerical” work and intervene when it is excessive with scribes or additional clerical support
- Develop institution wide educational programs about physician wellness
- Develop strategies to increase physician autonomy

Physical
- Provide smoke removal systems for the operating room
- Provide ergonomic assessments of surgeons in the operating room
- Obtain ergonomically designed monitors and instruments for minimally invasive surgery
- Provide on-site or access to an adjacent facility for exercise
- Replace foot pedals in the operating room with hand held equipment
- Create a system for reporting and assessing potential ergonomic issues in the operating room
- Provide call rooms that can be used for “catch up” sleep as well as nights on call
- Create call schedules that, when possible, limit call work to 60 h per week and call to 2 nights per week
- Create schedules that do not require operating the day following call
- Provide access to healthy food 24/7 close to the operating room

Emotional
- Provide organized and confidential support for surgeons following an adverse event, medical error or lawsuit
- Consider allowing 4–6 week “sabbaticals” every 5–7 years to study, travel or learn new techniques
- Increase transparency to demonstrate fairness in decisions and salaries
- Create compensation plans that avoid incentivizing excessive workloads at the cost of personal time
- Create a trusted and confidential method for reporting and treating impaired physicians
- Establish and demonstrate “zero tolerance” for sexual harassment and other forms of discrimination

Spiritual
- Align decisions and actions with a meaningful mission
- Insure that call schedules provide a full day off a week for recovery
- Create a system to provide confidential support after a significant personal or professional loss
- Show gratitude for hard work and successes, both personal and academic

limiting issues in our colleagues and ourselves early enough to prevent suffering and, if not recognized, true tragedies.[67,90] We should also work together to change our environment and our culture to promote and encourage self-care and health. For surgeons, this is a particularly difficult goal for two reasons. Culturally, there is pressure to remain silent about personal distress, making it hard to reach out to colleagues in distress or seek treatment for ourselves.[86] Secondly, it is often difficult to know when a colleague is truly in distress since the ability to function at work is maintained until late in the course of depression or burnout.[75] Therefore, it is important for surgeons to understand the early signs of burnout such as social withdrawal and increased irritability.[78] Other signs and symptoms of burnout include callous behavior towards patients or colleagues, physical exhaustion, poor judgment, excessive guilt, cynicism and a change in physical health such as new onset of hypertension, sleep disturbances, headaches and other symptoms.[67,91] On the more tragic end of this spectrum, the risk factors for suicidality include a recent divorce or break up, a major medical error in the previous 3 months, being sued and depression.[91] Surgeons have a 33% divorce rate after 30 years, higher than all specialties with the exception of psychiatry.[67] Even if we are able to identify a problem, there are significant personal and institutional barriers to helping a colleague. A third of surgeons do not believe they are prepared to deal with impaired colleagues and 10% would chose to ignore significant impairment.[75]

4. Spiritual well-being

Human beings have a need for meaning in their life and their work. Spirituality provides the context for that meaning, and is an essential part of human wellness. Burnout, often described in emotional terms is also a spiritual malady, "a deterioration of values, dignity, spirit, and will."[86] The importance of spirituality is recognized by surgeons. Along with protected time for relationships, surgeons rank meaning in work and "focusing on what is most important in life" as the most essential strategies to promote wellness.[12] The perspective gained and tools learned through a spiritual practice allow physicians to gain control by changing their perspective, which may be the single most powerful antidote to physician stress and burnout.[10,55,67] Developing a spiritual strategy to deal with the pressure and stress of work can lead to seeing work as not a place where energy is expended, but a place where renewal can occur though the meaning and challenges encountered every day.[53,67] As C.M. Balch has stated, "The practice of surgery offers the potential for tremendous personal and professional satisfaction. Few careers provide the opportunity to have such a profound effect on the lives of others and to derive meaning from work."[91] Seen through the lens of spiritual self-care, times of stress can be viewed as a moment to step back, an opportunity to evaluate priorities or even a time of professional growth. In this context, a bad day (or longer time period) is not necessarily a sign of burnout, but may be a sign to focus on renewal. Likewise, the stress felt after caring for a dying patient can be seen as the normal response of a compassionate physician.[91] Mindfulness, gratitude, self-awareness, and creating a personal philosophy are spiritual practices to improve spiritual self-care as they allow surgeons to "step away" from the sometimes overwhelming demands of work to recalibrate.[10,92] They also provide a space to notice the early warning signs of stress, allowing earlier and more effective self-care.[10] The practice of gratitude, which can be as simple as listing things you are grateful for, has been shown to decrease symptoms of depression and improve well-being.[92] Self-awareness and developing a personal philosophy allow clarification of personal priorities and values. Understanding these values leads to better articulation of short-term and long-term goals, and serves as a "compass" when making choices about work.[10] They also allow reframing of complicated or difficult issues, for example, understanding when it is time to move from cure to alleviating suffering for a patient with end stage disease.[10]

The importance of true rest, not just for physical recovery but as a spiritual practice, cannot be overstated. Most of the world's religions prescribe a day of rest or a "Sabbath" for recovery and renewal. Taking a full day, or even a half-day, to just play, rest, and relax is amazingly restorative. Taking a "digital sabbath" can be an important part of recovery from work. The constant stimulation of the digital world we live in can compound the stress we feel at work. Finally, taking the vacation days that you are given should be considered important ways to improve spiritual well-being. These more prolonged periods away from work to rest and renew are important for well-being and balance. Although rare in the world of surgery, many institutions recognize the positive return for offering professionals true sabbaticals, usually a month or two away from work to learn something new or start a new scholarly project.[2]

5. Conclusion

The art of surgery requires surgeons to be physically, emotionally and spiritually sound. Surgeon well-being should therefore be both an individual and institutional priority. Individually, surgeons and surgical residents should consciously develop plans for well-being that incorporate aspects of physical, emotional and spiritual self-care Table 2. Residency programs and surgical groups should develop curricula and insure that the principles and practice of self-care are taught and understood. These principles include attention to routine health care, exercise, healthy food, ergonomics, sleep and adequate rest as well as the presence of trustworthy friends to share struggles and joys. Institutions should develop proactive plans to support personal wellness such as insuring comfortable places to rest, eat and talk and providing healthy food in the workplace. All surgeons and administrators should work to develop policies and a culture that recognizes the importance of appropriately limiting time in the hospital, supporting individual efforts at self-care, and providing the time for genuine renewal.

Table 2
Individual strategies to promote surgeon well-being.

Physical
• Appropriate and scheduled visits to your PCP and dentist
• Age appropriate medical screening
• Immunization against Hepatitis B
• Report all sharps injuries and, when appropriate, obtain post-exposure prophylaxis
• Limit exposure to surgical smoke when possible
• Stand 6 feet away from fluoroscopy and x-ray machines when possible
• Use lead barriers when using fluoroscopy
• Stand on the "receiving" (intensifier) side of the fluoroscope
• Develop personal strategies to limit ergonomic injury in the operating room
• Seek professional assessment and therapy for persistent pain
• Establish a routine of regular exercise
• Eat good food on a regular basis
• Limit alcohol consumption
• Eliminate substance abuse with professional assistance
• Obtain 8 h of sleep a night whenever possible
Emotional
• Protect and nurture important relationships
• Debrief with trusted friends and family after stressful events
• Seek professional help for symptoms of depression or anxiety
Spiritual
• Establish a mindfulness, gratitude or other spiritual practice
• Participate in a religious community, if you practice a faith
• Spend time in nature
• Take a "Sabbath" each week by reserving at least half a day a week for true rest and relaxation

These are the eternal duties of a Physician: First … to heal his mind and to give assistance to himself before giving it to anyone else … Epitaph of an Athenian Physician, 2AD.[1]

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