Chapter 2
Why Surgical Mentoring is Important and Evidence That it Makes a Difference

I have learned that people will forget what you said, people will forget what you did, but people will never forget how you made them feel.

Maya Angelou

Key Concepts

- Most successful surgeons have had accomplished surgical mentors.
- Mentoring provides evidence-based personal and career benefits to the mentee.
- Immense personal satisfaction and a prolonged opportunity to help others are the principal benefits to the surgical mentor.

Most surgeons continue to seek challenges regardless of the stage of their careers. Whether preparing younger surgeons for private practice or an academic career, mentoring is one such challenge. This is particularly true for senior surgeons working in teaching hospitals and academic institutions. Both the mentee and the mentor benefit from the mentoring process. The mentee receives personal and professional benefits to his/her career which are documented in evidence-based studies. Mentoring provides an enormous sense of satisfaction to the mentor as well. The patient is the ultimate and most important beneficiary. This chapter presents an example of an exemplary surgeon who mentored other surgeons, reviews the rationale for the mentoring process as determined by its benefits to mentees, mentors and patients and provides evidence for this rationale.
Jonathan E. Rhoads – A Successful Surgical Mentor

It is meaningful to examine the careers of successful surgical mentors and their protégés as their lives and accomplishments provide inspiration for medical students and surgical residents to find mentors. A few of the many revered, successful surgical mentors from the latter half of the twentieth century include Professors Austen, Coller, Dunphy, Longmire, Moore, Sabiston, Spencer, and Wangensteen. One of us (JLR) was fortunate to have spent a considerable amount of time with an equally successful surgical “giant,” Jonathan Evans Rhoads (Fig. 2.1).

Dr. Rhoads spent his entire professional career at the University of Pennsylvania where he was Professor and Chairman of the Department of Surgery 1959–1972, and Provost of the University of Pennsylvania 1956–1959. He is perhaps best remembered for his research in intravenous feeding. His persistence in this field, combined with the able and creative assistance of his many surgical mentees, particularly Stanley Dudrick and Douglas Wilmore, led to the discovery of total parenteral nutrition (TPN). Currently used in every major hospital worldwide, TPN has saved thousands of lives.

Fig. 2.1  Jonathan E. Rhoads, M.D. 1907–2002 (Credit Yousuf Karsh, 1984)
Dr. Rhoads’ many career accomplishments have been chronicled elsewhere [1–3]; however, he is an outstanding example of how a single mentor/role model/surgeon can affect the creation of other successful surgical mentors. A list of his mentees who became surgical chairmen is shown in Table 2.1. The number of additional successful surgeons who trained under Dr. Rhoads’ mentees is exponential and their influences on today’s younger surgeons continue to be significant.

On a personal note, Dr. Rhoads’ “ghost” continues to haunt me (JLR) as rarely a day goes by without my invoking his presence. At times when I’m confronted with a difficult clinical decision or even a seemingly mundane action is required, I find myself asking “What would Dr. Rhoads do?” Recently, following an especially challenging operative day interspersed with varied administrative tasks, I finished my last case about 9:30 p.m. exhausted and barely able to change out of my scrubs. All I could think about was heading straight home, skipping dinner and going immediately to bed! Then I hesitated, remembering there was one inpatient whom I had not seen earlier in the day. She was an elderly lady, several days postop, in a distant part of the hospital, whom the chief resident had previously told me was doing well and I could definitely see her the next morning. The nagging question arose – “What would Dr. Rhoads do?” The answer was obvious – Dr. Rhoads would see the patient. By now it was after 10 p.m. Suffused with fatigue I reluctantly trudged to her room where I was surprised to see four family members who had waited several hours to see me. A rapid chart review followed by a brief physical exam (both unnecessary) confirmed the prior feedback that the patient was doing well and was ready for discharge in the morning. Her family (and she) was effusive in their gratitude for my seeing

### Table 2.1 Surgical chairmen trained by Jonathan E. Rhoads, Chairman of Surgery, University of Pennsylvania 1959–1972

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
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<tbody>
<tr>
<td>Clyde F. Barker</td>
<td>University of Pennsylvania</td>
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<tr>
<td>P. William Curreri</td>
<td>University of South Alabama</td>
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<tr>
<td>Stanley J. Dudrick</td>
<td>University of Texas Houston</td>
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<tr>
<td>Robert W. Crichlow</td>
<td>Dartmouth University</td>
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<tr>
<td>James O. Finnegan</td>
<td>Medical College of Pennsylvania</td>
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<tr>
<td>C. Everett Koop</td>
<td>Children’s Hospital Philadelphia, U.S. Surgeon General</td>
</tr>
<tr>
<td>Leonard D. Miller</td>
<td>University of Pennsylvania</td>
</tr>
<tr>
<td>F. Carter Nance</td>
<td>St. Barnabas Medical Center, Livingston, NJ</td>
</tr>
<tr>
<td>Charles C. Wolferth, Jr.</td>
<td>Hahnemann University</td>
</tr>
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their mother at such a late hour and mentioned it was definitely worth the wait. Once again Dr. Rhoads’ enduring mentoring influence had been felt. Never underestimate the far-reaching guidance of a good mentor!

### Importance of Mentoring to the Mentee

Most successful surgeons have had at least an association with an older, more experienced, successful surgeon. While one can argue whether this is an associative versus causative phenomenon, it is indisputable that something “happens” in this relationship which, in turn, influences the career success of the younger surgeon. This hierarchical experience permeates all levels of surgeons from the medical student rotating on a surgical service to the accomplished professor. There is a strong precedent for mentoring at the highest level of academic excellence as exemplified by more than 50% of US Nobel laureates having served under other Nobel laureates in the capacity of student, postdoctoral fellow or junior collaborator [4].

Mentoring benefits the surgical apprentice in many ways. Firstly, “doors of opportunity” are opened as the result of the acknowledged prestige, stature, peer recognition and accomplishments of the mentor. When referring to a young surgeon who has recently completed training, how often do we hear the compliment “He trained under the famous surgeon Professor X?” Whether or not completely justified, comments and associations such as these frequently provide an aura of instant credibility to the mentee. While one can dispute the appropriateness of this evaluation, associations with influential mentors continue to be vital in the twenty-first century to advance careers of young surgeons.

### Evidence-Based Benefits to the Mentee

#### Mentoring in Academic Medicine

Many investigators have tested the hypothesis that mentoring actually benefits the mentee. A recent review by Sambunjak and colleagues of the importance of mentoring in academic medicine
examined the actual prevalence of mentorship and its relation to career development [5]. Although this study did not address surgical training per se, many of the findings encompass all medical specialties. Based upon predetermined criteria, 42 reports describing 39 studies were selected for analysis from 3,640 citations and 142 full text articles. In a subset analysis of 24 US medical schools, faculty members with acknowledged mentors had significantly higher career satisfaction scores than those without mentors ($p<0.03$). In another subset analysis of Canadian OB/Gyn fellows, those with mentors were more likely to be promoted (CI 1.36–3.99) following completion of their training. This is a particularly relevant finding especially in today’s competitive medical environment. Additionally, there was a significant association between having a mentor and being the principal investigator on a research grant (OR 2.1–3.1). Despite these benefits to the mentee, fewer than 50% of medical students and, in some disciplines, less than 20% of faculty members had an acknowledged mentor. Furthermore, the investigators perceived that women had more difficulty finding mentors than their colleagues who were men (see Chap. 5). The authors concluded that mentors provide an important influence on the personal development, career guidance and choice, and overall productivity of the mentee.

An important paradox in Sambunjak’s report is the high percentage of junior faculty members who did not have an influential mentor despite proven benefits of the mentoring process [5]. Is this the fault of departmental Chairs and academic training programs or the lack of initiative of the potential mentees? It would seem all sides are, in part, culpable. As one matriculates through medical education, there is clearly less structure and more responsibility placed upon the junior physician to become a self-directed learner. It is imperative that senior mentors support and guide the mentee through this transition to self-reliance. Additionally, the proven benefits of this guidance should be brought to the attention of departmental Chairs who may then provide the resources to support this process (see Chap. 7).

Due to the reduced hours for clinical training in the USA, alternative teaching techniques such as simulation laboratories are now present in most surgical teaching programs. This topic is discussed extensively in Chap. 9. Simulation laboratories are outstanding examples of evidence-based support for surgical mentoring and will be briefly mentioned in this section. Simulation programs provide opportunities for objective measurements of mentoring and are particularly effective
in teaching surgical techniques. Questions arise as to the optimal methods to teach surgical skills and whether there is evidenced-based support to confirm these teaching methods. Murphy and colleagues conducted a randomized trial to determine the benefits of mentoring surgical trainers on a specific cognitive method to insert an internal venous jugular catheter in mannequins at the John Radcliffe Hospital, Oxford, UK [6]. Ten experienced surgeons were randomized to use either a 4-step cognitive instructional method or their own independent method to instruct medical students. When compared to independent techniques, students receiving the cognitive instruction had significantly better performance scores (Fig. 2.2). The investigators concluded that instructing the trainer in a cognitive training method results in a significant improvement in training outcomes.

As the result of the public outcry concerning “practicing on patients,” it is now mandatory that improved methods of teaching and mentoring be implemented in simulated settings. While trainers are not always mentors, the acquisition of surgical skills is particularly relevant in these settings. Although results of the aforementioned study show significant advantages to “training the trainer,” the challenging aspects of inserting a central catheter are not addressed in more difficult settings such as patients with either emphysema or previous thoracic surgery. Moreover, one can argue whether the statistically significant time saved in catheter insertion with the mentored approach is truly a clinically relevant difference. Despite these concerns, simulation labs are important settings for mentoring.

![Fig. 2.2 Performance scores of medical students with mentored training versus standard training (Reprinted from [6]. With permission from Elsevier)](image-url)
Regardless of the setting, it is imperative for the mentor to continue to emphasize the importance of thinking about the \textit{whole} patient and not just focusing on the technique being taught.

Investigators have questioned the relevance of having a faculty mentor present in a surgical skills laboratory. Jensen et al. evaluated the impact of expert instruction in laboratory based surgical skills training \cite{7}. Forty-five junior residents were randomly assigned to learn basic surgical skills (skin closure and bowel anastomosis) in either a self-directed or faculty-directed setting. When compared to self-directed learning, Objective Structural Assessment of Technical Skill, time to completion, and skin aesthetic rating were not significantly improved in the faculty-directed group, although isolated improvement in anastomotic leak pressure was observed. Although residents perceived faculty-directed training to be superior, this perception was not supported by objective analyses of performance. The investigators concluded there was minimal objective evidence in the simulation lab that faculty-directed training improved transfer of certain learned skills to more complex tasks. While these findings differ from the Murphy report, clinical tasks were not the same in each study. The teaching of many surgical skills can most likely be performed well by a senior level resident, whereas others are better taught by an experienced mentor.

\textbf{Mentoring and Research}

Success in research is one of the most consistent examples of the benefits of mentoring. Steiner and colleagues examined the influence of mentors on the research development of 215 Primary Care Fellows who were recipients of National Research Service Awards between 1988 and 1997 \cite{8}. The purpose of the study was to investigate the quality and quantity of their mentorship experience. Twenty-seven percent had no influential mentor and 73\% identified an influential mentor. When compared to their unmentored colleagues, individuals with influential mentors spent more time conducting research ($p=0.007$), published more papers ($p = 0.003$), were more frequent principal investigators on grants ($p = 0.008$) and provided more research mentorship to others ($73\%$ vs. $36\%$ without influential mentors $p = 0.008$). This study is particularly relevant because it is increasingly more difficult to obtain research funding. Moreover, it is almost impossible to succeed in research without recognition by one’s peers.
as exemplified by serving as a principal investigator on a grant funded by a prestigious organization such as the National Institutes of Health. The major influence of mentoring on the research career of the junior investigator continues to be acknowledged as noted in this study.

**Medical Students Rotating on Surgical Services**

As detailed in other sections of this book, patients are becoming increasingly more adamant about not being “practiced upon” during their operations. Additionally, increased student involvement may unnecessarily prolong the operation, which in turn, has both clinical and financial implications. Nonetheless, placing a few sutures or staples in the skin often has an enormously positive influence on the medical student, at no proven detriment to the patient, and it may “plant the seed” for a surgical career. The role of the attending surgeon is vital in these situations. If the major segment of the operation has proceeded uneventfully and if the patient has no major co-morbidities, the student can be more engaged as discussed.

Attracting more medical students into careers in surgery is a major goal of residency program directors and surgical chairs. Berman and colleagues sought to identify the aspects of surgical clerkships that influenced a medical student’s decision to select a surgical career [9]. Students who sutured \( p=0.001 \), or operated the laparoscopic camera \( p = 0.01 \) felt more involved in the operating room and viewed residents and attendings as positive role models. These students were four to seven fold more apt to enter surgery (95% CI 1.1–466.8) when compared to their less involved colleagues. The investigators concluded that students who participate actively in the operating room and those exposed to positive role models are more likely to be interested in pursuing a career in surgery. This study provides strong support for meaningful engagement of students in the operating room.

Despite the acknowledged benefits of getting the student “involved” in the operation as noted in this report and others [9, 10], the question is whether this tradition (as remembered and appreciated by many of us) is appropriate in the twenty-first century? At the University of Wisconsin, O’Herrin and co-authors reviewed and analyzed the completed operative logs of 146 third year medical students with respect to the residencies in which they matched. In spite of finding no significant
differences between the total number of operative cases observed for students matching into general surgery, surgical subspecialty or nonsurgical residencies, students who matched into categorical general surgical programs saw significantly more abdominal and general surgical operations than those matching into either surgical subspecialty or nonsurgical residencies [10]. These studies underscore the importance of acknowledging the medical students as part of the surgical team and allowing them to actively participate in general surgery operations.

**Specialty Selection of Surgical Residents**

Mentors frequently provide an important influence on the specialty and job/career selection of the surgical resident. In some instances this influence occurs merely by serving as an example, whereas in other situations, the mentor has a more proactive role in career decisions of the mentee. Mentoring by example often includes subliminal communication by the mentor through behavior, attitudes and an expression of job satisfaction and personal fulfillment. Every experienced surgeon has learned there is no utopian job. As a result of age and experience, the surgical mentor is generally well qualified to elucidate both the favorable and unfavorable aspects of various job and fellowship opportunities and to help guide the younger surgeon to an independent decision. This guidance is not solely based upon the resident’s interests but also incorporates the younger surgeon’s aptitudes and abilities.

The reasons for choosing a surgical specialty for a resident in training were investigated by Ko and colleagues [11]. Three hundred and fifty-two surveys from senior surgeons of regional and national societies were reviewed. The most common reasons for choosing a specialty were role models or mentors (56%), research interests (51%) and available patient population (23%). Stages of training at which the respondents became most interested in a specialty or an area of surgical expertise were at the junior resident level. This study confirms the significant influence of attending surgeons on career choices of surgical trainees during early periods of residency training. These results have implications for the types (i.e., general surgery, plastics, surgical oncology, etc.) and length and frequency of rotations on various surgical services for interns and junior surgical residents. Furthermore, as many training programs are moving to “early
branching” with less exposure to general surgery, the need for faculty mentoring is projected to be even more relevant in the future especially during the first 2 years of training in general surgery.

Thankur and co-investigators studied the impact of various influences, including mentor guidance, on the career selection of 86 graduates of UCLA’s surgical residency between 1975 and 1989 [12]. Not surprisingly, the most important influence was the resident’s interest in a specific area. Two-thirds of the respondents chose the same career as their mentors, attributing this to the mentor’s skill, achievements, and fellowship recommendations within their own specialty. The investigators concluded that mentor guidance was an important criterion in selecting career specialties.

More recently, the impact of mentoring on career choices by surgical residents was investigated. McCord and colleagues sent a 32 item web survey to 99 graduates of the University of Wisconsin surgical residency who matriculated between 1985 and 2007 [13]. An important focus of this study was to determine the effect of mentoring on career decision-making in graduates who acknowledged an influential mentor when compared to their colleagues who did not identify such a mentor. The response rate was 84%. Sixty-one (75%) indicated an influential mentor was either important or very important in ultimately selecting their specialty field. The mentored residents identified clinical expertise (77%), being a role model (72%), and practicing professional integrity (70%) as the most important mentor characteristics which influenced their career decisions. In the mentored group the majority of respondents [72% (43/60)] were in the same field as their mentor \( (p < 0.0001) \) as shown in Fig. 2.3. It was concluded that mentored surgical residency graduates were likely to enter the same specialty and practice type as their mentors. Additionally, the earlier in training the mentor was identified, the more likely the trainee selected the same specialty as the mentor. Similar findings have been noted by others [14].

The results of these reports and others are consistent with observations of most senior attending surgeons and those responsible for residency training programs. Although the Wisconsin study was only conducted in one training program, the findings can probably be extrapolated to other surgical residencies. An important caveat is these results will only occur in a training program which has quality mentors and where mentoring is given a high priority by the surgical chair. As mentioned, these findings are not surprising to senior surgeons. When reflecting on their own careers, many senior surgeons are chagrined as to the paucity of objective criteria
Importance of Mentoring to the Mentor in support of their decisions to become a surgeon. More often than not, the decision was strongly influenced by an enthusiastic and knowledgeable individual (e.g., mentor) who took a special interest in a young trainee, thus resulting in a major, life-altering career.

**Importance of Mentoring to the Mentor**

Most individuals who have assumed the title of senior surgeon readily acknowledge the importance and continued impact of mentors in their own careers and personal lives. Moreover, many senior surgeons feel an obligation to perpetuate this rich surgical legacy and to repay “debts.” This concept is eloquently expressed by Daloz who states, “What we model for our students is not our knowledge, but our curiosity, the journey, not the destination. As teachers, we recognize that we are channels through which information flows, configuring itself into certain patterns they may name ‘knowledge.’ However, the tradition we keep is not the knowledge itself but the capacity to generate it” [15]. Consequently, it behooves interested and experienced surgeons, whenever possible, to mentor their younger colleagues.

The enriching experience of mentoring leads to enormous rewards for the mentor, the most significant of which are subjective. There is indeed a purposeful feeling which arises from sharing information and experience. Surgeons with major teaching responsibilities often live

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**Fig. 2.3** Comparison of specialty selection of graduates and their mentors (Reprinted from [3]. With permission from Elsevier)
vicariously through the achievements of their trainees and find their accomplishments provide enormous personal joy and gratification. What greater contribution can a surgeon make to his/her younger counterpart than to “plant the seed” as to the importance of pursuing excellence, stimulating curiosity, asking the right questions, and mandating dedicated scholarship and ethical decision making in surgery? Furthermore, as the mentee matriculates and becomes a recognized authority in his/her field, especially in another institution, professional networks expand accordingly and the mentor may find his/her own career and stature indirectly enhanced by the mentee’s success(es).

The mentor also receives objective benefits from the two-way process of mentoring. The assistance from a mentee/protégé in perioperative and intraoperative care and being “challenged” by his/her innovative and therapeutic suggestions help keep the mentor “sharp.” Exposure to the mentee’s high energy, inquisitiveness and increased familiarity with new technologies collectively keep the mentor well informed, current and involved in surgical advances. These interactions may enhance the “persona” of the mentor and in turn bring exciting new perspectives to clinical care. Additionally, mentors with increasing clinical or administrative responsibilities and major research commitments realize the importance of a junior research mentee. These younger individuals are frequently the key determinants in the overall success of a laboratory or a specific research project.

Perhaps the mentor’s ultimate reward is the realization that he/she provides positive impact on younger surgeons and their patients even after the mentor’s retirement and subsequent death.

Importance of Mentoring to the Patient and Surgical Care in General

The most significant benefit of surgical mentoring is to the patient, thus collectively improving surgical care in our society. It is estimated that the learning of key clinical patterns may encompass the first two-thirds of a surgeon’s career [16]. This long learning process emphasizes the importance of mentoring early in the training of the mentee especially since more surgeons are retiring in their mid-50s. It stands to reason that if senior surgeons become involved in mentoring and convinced of its value, their careers will be extended,
increased mentoring of younger trainees will ensue and more patients will be the ultimate beneficiaries. As most senior surgeons have learned, the process of transferring knowledge and perpetuating wisdom primarily accrues through clinical experience. Hence, it is intuitive that if the professional longevity of the surgeon is prolonged, general improvements in healthcare will accrue. As surgeons age and become clinically less active, increased time may be available for mentoring. Furthermore, this setting is a perfect opportunity for experienced surgeons to continue to make a difference even though they may not be directly caring for patients. Additional opportunities to mentor result from somewhat lessened pressures to generate departmental revenue, and decreased stresses engendered by competing for patients in a fixed clinical population. The mentoring process creates a “win-win” situation wherein the early and continual transfer of surgical knowledge benefits the mentee, patient and surgical care in general.

**Summary and Conclusions**

Most successful surgeons have been mentored by accomplished surgeons. Mentoring provides numerous objective and subjective benefits to enhance the professional career and personal successes of the mentee. These benefits are confirmed in evidence-based studies and include guiding selection of surgical careers, enhancing research productivity, facilitating acquisition of fellowships, and obtaining jobs in private practice or academic institutions. Most of the benefits to the mentor are subjective such as enormous personal satisfaction, feeling of accomplishment, and a sense of purposefulness by helping patients long after one’s retirement. The results of surgical mentoring collectively improve patient care and enhance healthcare throughout our society.

**References**

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