The American Surgeon
00(0) 1–9

DOI: 10.1177/0003134820939878
journals.sagepub.com/home/asu
SAGE

Henry L. Laws II Lecture: The Importance of Collaboration in Advancing Quality

John F. Sweeney, MD[1]

Introduction

It is a tremendous honor to have been asked by the Southeastern Surgical Congress (SESC) to give this year's Henry L. Laws, II lecture. Before moving forward with my remarks regarding the importance of collaboration in improving surgical quality, I would first like to acknowledge Dr Laws (Figure 1).

Dr Laws was born and raised in Columbus, Mississippi, in 1933. He received his undergraduate degree from the University of Mississippi and then enrolled in medical school. After completing 2 years of medical school at Ole Miss, he transferred to the Harvard School of Medicine, where he finished his final 2 years of school graduating in 1956. After undertaking an internship at Baylor, he completed his general surgery training at the University of Alabama at Birmingham (UAB). He then went into private practice in Anniston, Alabama, for the next 8 years before being recruited back to the Department of Surgery at UAB. It was during this time point that Dr Laws began his career-long interest in surgical education. After 8 years with the Department of Surgery at UAB, Dr Laws moved to Carraway Medical Center where he was the program director of the general surgery residency program at that institution.[1]

Dr Laws was a surgical innovator. He embraced the new technology of laparoscopic surgery when it burst onto the scene in the late 1980s and early 1990s. He was actively involved in teaching surgeons in the Southeast minimally invasive surgical techniques. He was a co-author of some of the earliest articles describing laparoscopic inguinal hernia repair.[2] He also published one of the earliest randomized prospective trials to compare Laparoscopic Nissen Fundoplication to Laparoscopic Toupet Fundoplication for the treatment of refractory gastroesophageal reflux disease.[3]

Dr Laws was a leader in American Surgery during his career. He was President of the Association of Program Directors in Surgery which acknowledged his career-long commitment to surgical education. He served on the Board of Governors of the American College of Surgeons demonstrating his commitment to our profession and that he was greatly respected by his surgical peers across the country. Finally, Dr Laws was President of the SESC from 1997 to 1998 and received the Distinguished Service Award from SESC in 2012. Although I never had the chance to meet Dr Laws, in speaking to those that knew him, it is clear that he was a surgeon's surgeon. He cared greatly for his patients, he was a surgical innovator, and he was a relentless educator of the next generation of surgeons. If he were actively practicing surgery today, I am certain he would embrace the concept of quality collaboration to improve the outcomes for his patients and would be a leader in the field of surgical quality improvement.

I have 4 goals that I would like to accomplish by the end of this lecture. We will first start with definitions of quality and collaboration and how they work together. Next, we will describe the stakeholders that must be enrolled and engaged in the quality improvement process to enhance the delivery of care for our patients. Following this, we will focus on an example of quality collaboration at the local entity level to impact the outcomes of patient care. Finally, we will then focus on examples of quality collaboration at the regional and state level that improve patient care.

Definitions

I enjoy showing this photo when giving a talk about the impact of collaboration on quality improvement in surgery (Figure 2). The photo proves that I did play football during my undergraduate days at the University of Notre Dame. I also believe that the photo is a great snapshot in time of collaboration in action. We will circle back to this example at the end of the lecture.

[1]Department of Surgery, Emory University School of Medicine, Atlanta, GA, USA

Corresponding Author:
John F. Sweeney, MD, Department of Surgery, Emory University School of Medicine, Emory Healthcare, 1364 Clifton Road NE, Suite B-206, Atlanta, GA 30322, USA.
Email: jfsween@emory.edu

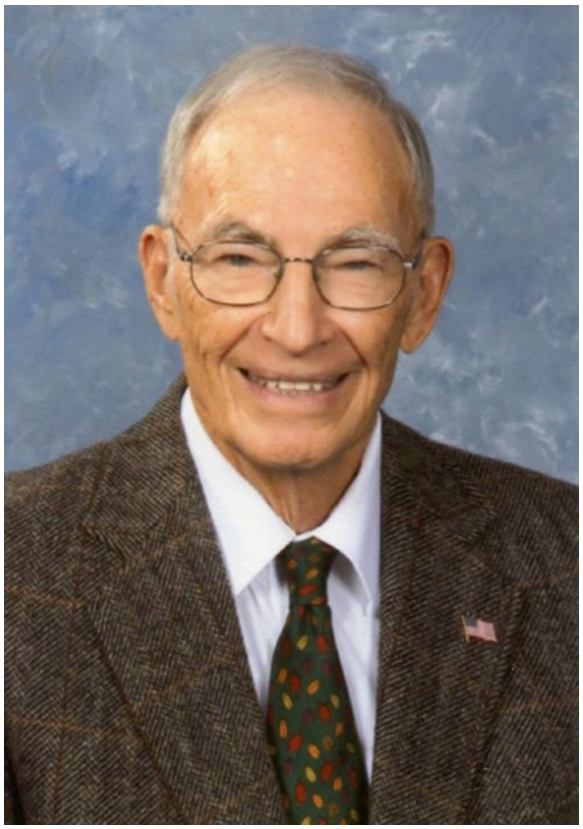

Figure 1. Henry L. Laws, Jr, MD.

Definition of Quality

There are multiple definitions of quality depending on the context and source of the definition you are looking for. Webster's dictionary defines *quality* as a *peculiar and essential character or an inherent feature*.[4] Practical examples using this definition could include "my son Keenan's flaming red hair is a distinguishing characteristic." Webster's dictionary also defines quality *as a degree of excellence or superiority in kind*.[4] Examples using this definition include, "that is a quality cigar" or "this scotch has smooth quality." In manufacturing or business, quality is defined as *a measure of excellence or a state of being free from defects, deficiencies, and significant variations*.[5] In the manufacturing arena, top quality is achieved by adhering to specific standards that create a uniformity of a specific product in order to provide the customer with the highest user requirements possible. Take the example of an automobile company. If there is a lapse in quality during the manufacturing of an automobile, this could result in a major safety issue and result in a major product recall that will significantly cause not only inconvenience to the customer but also diminish consumer trust in the manufacturer. The definition of quality in healthcare is *the degree to which healthcare services improve individual patient and/or population health and are consistent with current professional knowledge*.[6] I have a difficult time wrapping my in head around this definition as it is too mechanical and does not pay homage to the humanity of healthcare provision. I am much more able to align with the definition of health care quality that was developed by William A. Bornstein MD, PhD, Chief Quality Officer for Emory Healthcare. Dr Bornstein defines health care quality as "partnering with patients and families to reliably and safely deliver care that is based on the best available evidence, is consistent with patient and family preferences and which is delivered when, where, and how the patient and their family wants it."

Definition of Collaboration

Webster's dictionary defines collaboration as *the act of two or more people or organizations working together to achieve a common goal*.[7] A second definition for collaboration which is listed in Webster's dictionary *is traitorous cooperation with an enemy that is occupying your country*.[7] This second definition seems to be completely in conflict with the first definition of collaboration. Synonyms for collaboration include partnership, cooperation, and teamwork.

In addition, please keep in mind that surgery is what I like to call a "contact sport." Back in my football playing days, my coaches would say that about the game of football. No matter how hard you train, how hard you practice, or how hard you prepare, injuries are unavoidable in a contact sport, and it is therefore critical to do your utmost best to limit those injuries. The same is true of surgery. We undertake complex interventions on our patients that are not without risk and no matter how hard we prepare complications are inevitable. Therefore, any efforts that are implemented to improve surgical quality must have at the center a rigorous program in place to reduce surgical complications. Putting it together, quality collaboration in my view involves the creation of multidisciplinary teams that come together to partner with patients and families in order to deliver the most reliable, safe, and cost-effective care when, where, and how patients and their families want it. The benefits of collaboration in health care quality can be very far-reaching. But also it can be nearly impossible to make collaboration work. It is truly critical to identify, understand, and engage each stakeholder in the quality improvement process in order to successfully develop a collaborative team and deliver the highest quality care for patients.

Figure 2. University of Notre Dame Football, 1980.

Identifying the Key Stakeholders That Influence Quality Collaboration

Historically, the strategy for health care delivery was one of operational effectiveness. Health care systems and providers targeted well-reimbursing product lines and then worked toward capturing market share and maximizing the throughput of patients in those product lines. There was a limited focus on the quality and cost of care delivered to patients. Over the last few decades, there has been a significant shift in focusing on the value of care (quality/cost) delivered to patients. There have been advances in pay for performance payment models as well as a focus on the quality of care delivered to patients by payors. In this environment, it is incumbent on all members of the perioperative team to have a real understanding regarding the quality of surgical care that is being provided to patients. Participation in quality programs like the American College of Surgeons/National Surgical Quality Improvement Program (ACS/NSQIP), Society of Thoracic Surgeons (STS) National Database, or the Vascular Quality Initiative (VQI) is critical in order to identify how we are doing and where there are concerns and/or opportunities for improvement. To move the dial and improve quality, it will also be imperative to develop multidisciplinary teams that are made up of the key stakeholders that have an influence or a stake in the game. Surgeons that lead these teams must understand who the key stakeholders in surgical quality improvement are and what is important to each of those groups. Developing interventions that address factors that are important to the key stakeholders, will improve their engagement, and potentially play a role in garnering more resources that can be used to further impact the quality of care delivered.

The major stakeholders in the surgical quality improvement process include patients and their families, payors/insurance companies, employers, health care systems/administration, and providers (referring physicians, surgeons, anesthesiologists, nurses, technicians, etc.). As I mentioned above, patients and their families want safe, highly reliable, and cost-effective care when, where, and how it is most convenient. Payors/insurance companies are most focused on the cost of care that is being provided to their insured members. They also realize that poor quality care, which in the surgical world is primarily driven by perioperative complications, also significantly increases

costs, and therefore this stakeholder may be willing to support initiatives or payment models that drive quality improvement. Employers are focused on 2 issues. First, health care premiums are a tremendous expense for employers. In addition, having employees out on medical leave for longer than the expected amount of time creates significant pressure on the business and other employees. For both of these reasons, employers will also have a significant interest in improving surgical quality. Health care systems/administration are interested in high-quality care at a market competitive price. The increased cost associated with poor quality care will eat into already thin operating margins. In addition, poor quality care increases hospital length of stay, which results in a subsequent opportunity cost leading to an inability to take care of new patients. The final stakeholders in the surgical quality improvement process are the providers that function in the perioperative realm. As mentioned above, this includes referring physicians, surgeons, anesthesiologists, nurses, technicians, and other ancillary staff. In general, providers want the resources needed to provide the best care possible for their patients. They are also inherently competitive and will work to improve the quality of care if they are provided reliable data that suggests that the care they are providing is not quite as good as it could be.

Quality Collaboration at the Local Level: Wound Infection Group

Let's look at an example of quality collaboration at the local level. In January 2011, Emory University Hospital (EUH) received its semiannual report from ACS/NSQIP. When Dr Joe Sharma (Vice Chair of Quality, Emory Department of Surgery) and I carefully reviewed the report, we had a "Houston, we have a problem" moment. Our observed rate of surgical site infections (SSIs) in colorectal surgery was more than 60% higher than what would be expected based on the characteristics of the patient that we were operating upon. These results put our institution in the 10th (worst) decile of all ACS/NSQIP participating hospitals and generated a "needs improvement" comment in the semiannual report.

After some discussion, I asked Dr Sharma to lead a task force with the primary goal of addressing this problem. Joe set about establishing a multidisciplinary team, we affectionately called the Wound Infection Group (WIG). WIG was made up of individuals from surgery, anesthesia, nursing, hospital administration, and hospital ancillary services. In addition, support was provided from the Emory Healthcare Office of Quality, as well as a CDC liaison, EUH facilities management, and other ancillary staff

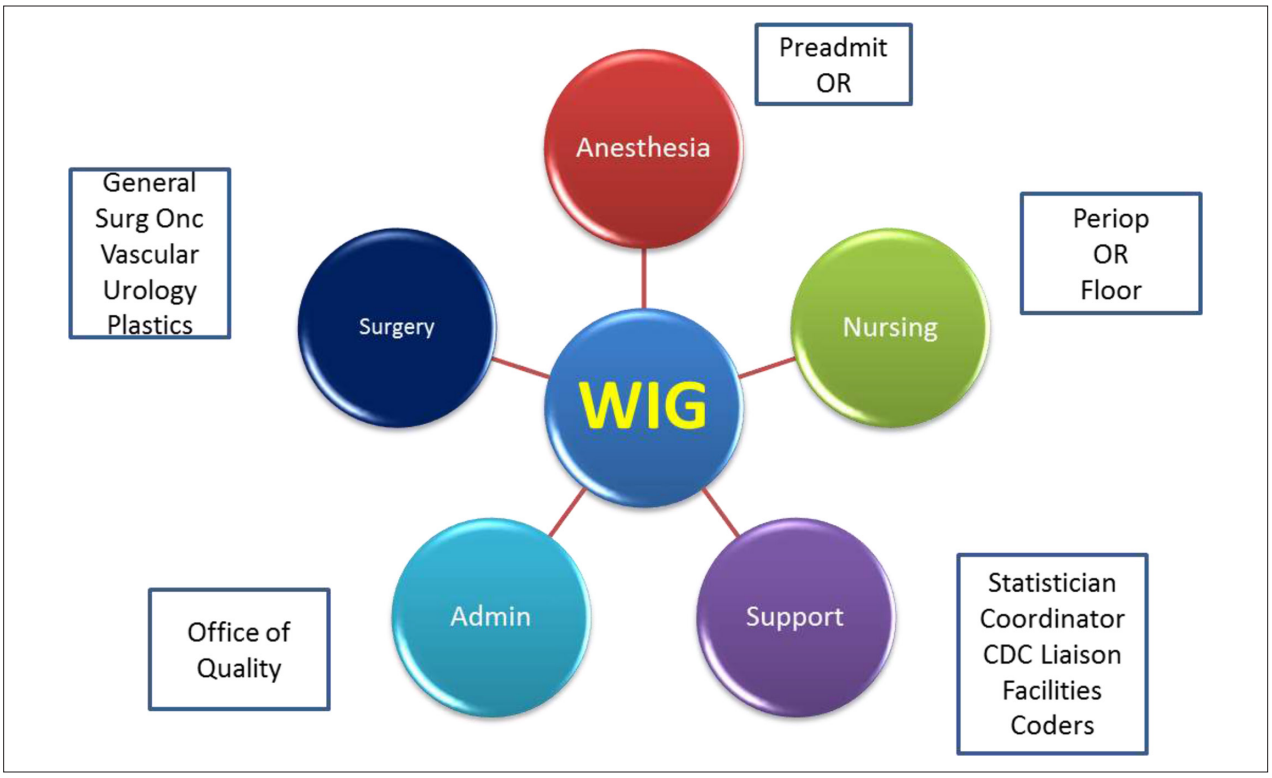

Figure 3. Wound infection group stakeholders.

Figure 4. Wound infection prevention process.

(Figure 3). At the time, we thought we were being very inclusive but a very careful review of the stakeholders listed in Figure 3 will demonstrate that we left the most critical stakeholder, the patient, off the team. This was identified early in the process and representatives from the Patient and Family Advisory Council were also included going forward.

After initial meetings, WIG defined 2 goals. The first goal was to develop a wound infection prevention process (WIPP) that would be implemented in colorectal surgery at EUH as the original test of change. The second goal was to reduce surgical site infections at Emory University Hospital by 40% or more in order to move the observed to expected (OE) ratio for surgical site infections in colorectal surgery to 1 or less. The group did an extensive search of the literature searching for any and all interventions that had some level of evidence for decreasing surgical site infections. After completing this careful review, the WIG assigned interventions they felt might make a difference, into 1 of 4 potential perioperative time frames that a patient would progress through as part of their surgical experience (Figure 4) to create the WIPP. The WIG was chartered shortly after the semiannual report was received in 2011, and the colorectal WIPP was implemented approximately a year later, and within 6 months, we began noticing improvements in SSIs at EUH. Within 1 year after implementation of WIPP, the number of SSIs in colorectal surgery had dropped by approximately 40%, and we had achieved our goal of an OE ratio of less than 1. We also saw a corresponding decrease in the SSI rate in all specialties at EUH during that same time period.

As you can imagine, we were elated with these results but over the course of the next year, our performance again began to decline and we subsequently had an increase in our OE ratio for SSIs at EUH to a level greater than 1 indicating we again were having more surgical site infections than would be expected for our patient population. Around that same time point, we began noticing that the rate of SSIs across all the hospitals within the Emory Healthcare system was elevated. Because of this, additional resources were brought to bear by the health care system to focus on the problem. After a careful systematic review, it became clear that the majority of SSIs that we were having in this rebound were related to an antibiotic miss. Either the patient was not receiving the appropriate antibiotic for prophylaxis, the antibiotic was not being given before the surgical incision

was made or it was not being redosed during long surgical procedures. We also did a value stream analysis of prophylactic antibiotic administration in the perioperative period and noted several things. First, there was not a standard prophylactic antibiotic order set. Second, the nurses in the preoperative holding area were constantly searching for providers to place an order in the electronic record so that the prophylactic antibiotics could be obtained from the pharmacy. This led to delays in the infusion of the initial prophylactic dose of antibiotics, and it also led to conflicts in the appropriate antibiotic use for prophylactic antibiotics. Dr Sharma enlisted the help of Dr Grant Lynde (Vice Chair for Quality, Emory Department of Anesthesiology) and together they worked with a multidisciplinary team including representatives from the pharmacy and Emory Infection control, to develop a standardized antibiotic order set for perioperative prophylaxis that was informed by the literature but also by our antibiotic sensitivities across Emory Healthcare. In this process, we also changed the workflow for ordering and administering prophylactic antibiotics. Because we had developed an agreed-upon antibiotic order set, we felt it was no longer necessary for there to be an order placed by the surgical service to have the pharmacy send the appropriate antibiotic to the preoperative holding area. Instead, we shifted the responsibility for choice and administration of prophylactic antibiotics to the anesthesia team by stocking their medication carts with the agreed-upon antibiotics. This simple maneuver had a dramatic impact on the ease of antibiotic administration and completely removed the inefficient steps of placing an order and then having to receive it from pharmacy before it could be infused into our patients prior to surgery. Lastly, Dr Lynde and Dr Sharma worked carefully with Emory IT to develop an automated next day report/notice for all cases of antibiotic failure. This report was sent to all members of the operative team, not just the primary surgeon, and has also had a significant impact on improving antibiotic prophylaxis in the perioperative period.

This WIG/SSI project at Emory University Hospital is a tremendous example of the impact of quality collaboration on the outcome of a significant postoperative surgical problem at the local level. The group carefully defined its intervention; in this case, decreasing surgical site infections to an acceptable rate. The group identified and engaged key stakeholders and despite initial best intentions recognized that the most important stakeholder (the patient) was omitted from the process. It is important to point out that it is not uncommon for this to occur despite best intentions, and when that occurs inviting these key stakeholders to join the process is usually all that is necessary. This example also demonstrates that it is important to keep assessing and refining your intervention and to remember that the work is never done. If you take your eye off the prize, it is very likely that you will lose the gains that have been made.

Quality Collaboration at the System, State, or Regional Level

Just as at the local entity level, there are tremendous opportunities for quality collaboration across health systems, states, and regions. State or regional collaboratives provide the opportunity to exchange ideas and solve problems with members across institutions that share similar patient populations. Through enhanced data sharing, there is also the ability to understand complex quality issues in specific patient populations that might not be garnered from a small subset of data at an entity level. Quality collaboration at the regional and state level can also catalyze important relationships across institutions which not only can facilitate improving surgical quality but also may eventually serve as a platform for regional interventions or for collaborative clinical trials. In addition, the relationships developed through state or regional quality collaboratives could serve as a platform for regional or national health system crisis preparedness.

Core principles that are key to the development of a regional or statewide quality collaboration include maximizing the exchange of surgical best practices using a standardized quality reporting system to compare outcomes and identify best practices.[8] Strong clinical and administrative leadership is also key. It is critical to identify stakeholders that may support the administrative costs of the collaborative program if possible. Regular collaborative meetings are a cornerstone for any regional or statewide surgical quality collaborative. At these regular meetings, the opportunity to identify and develop a quality improvement project that has an agreement of all participants is possible. It is also important to choose a quality improvement program or project that is feasible and can be accomplished which will generate further interest and support by members of the collaborative.[8]

Michigan Surgical Quality Collaborative

Let's look at a few examples of successful statewide quality collaborative's. After I completed my general surgery training at the University of South Florida in 1995, I joined the Section of General Surgery in the Department of Surgery at the University of Michigan. At that time, Darrell A. "Skip" Campbell, Jr, MD was the Section Head of General Surgery. He was a fantastic leader, mentor, and friend to all of his colleagues. However, in 1997, Skip made the decision to step down as head of General Surgery at Michigan and he pivoted his focus to improving surgical quality. Around that same time, he had met Dr Shukri Khuri, who was the founder of National Surgical Quality Improvement (NSQIP) in the Veterans Affairs system. Together with colleagues at Emory University and the University of

Kentucky, Skip and Shukri demonstrated that the models and methodology developed for VA NSQIP could be applied to drive surgical quality in patients having surgery in private sector hospitals.[9] A larger multi-institutional study was then undertaken which also demonstrated favorable results leading the American College of Surgeons (ACS) to adopt NSQIP as its primary quality program.[10] Today, over 700 hospitals are enrolled in ACS/NSQIP and utilize it as a platform for surgical quality improvement.[11]

In order to accelerate the pace of quality improvement, a regional organization of hospitals in the State of Michigan that was focused on quality improvement was proposed.[12] With the support of Blue Cross Blue Shield of Michigan, the dominant payor in the state, the Michigan Surgical Quality Collaborative (MSQC) was developed. Using the standardized outcomes platform of ACS/NSQIP, the members of MSQC captured data which allowed them to identify outcome variation within the group. They identified best performers and then disseminated best practices to all members of the collaborative leading to decreased complications and improved patient outcomes. Quarterly meetings were put in place which allowed the exchange of ideas and also the identification of regional quality initiatives to include colectomy outcomes, standardization of venous thromboembolism prophylaxis, and postoperative myocardial ischemia prevention. A careful evaluation of the impact of MSQC demonstrated that the cost reduction associated with decreased complications paid for the overall costs of MSQC and actually saved Blue Cross Blue Shield of Michigan money. Essentially, a statewide quality improvement initiative will pay for itself.[13] Today, 70 hospitals in the State of Michigan and over 2500 physicians participate in the MSQC. MSQC is led and coordinated by surgeons and has become an excellent example of the impact a statewide quality collaborative can have on surgical outcomes for patients in a given region.[14]

Tennessee Surgical Quality Collaborative

An example of a successful statewide quality collaborative that is closer to home for members of the SESC is the Tennessee Surgical Quality Collaborative (TSQC). Around the time that MSQC was beginning to develop significant traction in the State of Michigan, Dr Joe Coffer from the Department of Surgery at the University of Tennessee at Chattanooga and Erlanger Health System had the opportunity to hear Dr Campbell speak at a national conference. He was very intrigued by the significant improvements in surgical quality that occurred across the state of Michigan. After several conversations with Dr Campbell, Dr Coffer approached surgical leaders across the state of Tennessee and enlisted their help in developing a similar initiative. The TSQC was established in 2008 as a collaboration between the Tennessee Chapter of the American College of Surgeons and the Tennessee Hospital Association with the help of a generous grant from Blue Cross Blue Shield of Tennessee's Health Foundation. Today, over 20 hospitals participate in this collaborative which has made a significant impact on morbidity and mortality across the state of Tennessee for patients undergoing surgical interventions.[15]

South Carolina Surgical Quality Collaborative

Another example of a statewide surgical quality collaborative is the South Carolina Surgical Quality Collaborative. This regional collaborative is made up of 8 facilities whose goal is to improve the quality and value of general surgical care in South Carolina using a web-based data collection system that provides real-time outcomes data to participating surgeons. This joint effort between Health Sciences South Carolina, the South Carolina Hospital Association, and the Blue Cross Blue Shield of SC Foundation has established a supportive network for sharing best practices and promoting data-driven quality improvement.[16]

Georgia Quality Improvement Program

Lastly, the Georgia quality improvement program is a combination of hospitals across the State of Georgia that participate in at least one or more quality improvement program, including institutions that participate in Adult ACS/NSQIP, Adult ACS/Trauma Quality Improvement Program (TQIP), Pediatric ACS/NSQIP or Pediatric ACS/TQIP. The Georgia Trauma Commission provides financial support for the administrative infrastructure of the collaborative. While there is the opportunity for institutions that participate in a unique quality program to carry out projects and activities specific to those patient populations, joint management, and oversight of the entire statewide quality collaborative also allow for combined efforts focusing on consistent areas of concern. In the end, pediatric surgeons learn from general surgeons who learn from trauma surgeons regarding best practices for eliminating perioperative problems like acute kidney injury, surgical site infections, or postoperative pulmonary complications.

State and regional quality collaborative works. The challenges are many and include securing funding for the administrative component of the collaborative, developing a culture of collaboration as opposed to competition between collaborative members and identification of a

quality improvement initiative that can successfully be completed. The decreased morbidity and mortality for patients undergoing surgical care across the collaborative region, dollars savings associated with improved outcomes, and the dissemination of best practices across the region are tangible benefits and justify the time and effort put into establishing a collaborative. Perseverance and persistence are key!

Conclusion

Back to the photograph (Figure 2). As I said earlier, this photograph is a snapshot in time of quality collaboration in motion. Notice that the offensive guard (#64), the fullback (#33; myself), and the tailback (#22) are all in motion at the same time and appear to be in perfect alignment. Yet, we all are looking at something different, because we all have a different job to do. Because we practiced this play over and over in a simulated setting, we are all able to anticipate each other's reactions to changes in the environment initiated by the other team's defense. If our reactions are consistent and appropriate, the result of the play will be a positive gain or possibly a touchdown. If not, the result will be no gain, a loss of yardage, or even possibly a turnover. In comparison, think about the operating room team. Each member of the operating room team also has a different focus or job to do, but how often do we practice over and over in order to maximize results and minimize problems? How well does the team adapt to an unexpected change in plan at the spur of the moment? In the background of the photograph, you can see the fans are watching. While in general, the fans are not experts in the intricacies of the offensive or defensive portions of a football game, they can recognize when a play is successful or not. The same is true for our patients and their families. While they do not understand the intricacies of a complex gastrointestinal procedure or a vascular anastomosis, they do understand the difference between success and failure as manifested by poor surgical outcomes or complications. Also in the background of the photo is the official or referee. He is intently focused on detecting any illegal play or activity and will call a penalty the moment he sees it occur. We too are being watched by health care officials who will also call a penalty if they notice deviations in the quality of care or outcomes. Working together in multidisciplinary, collaborative teams we can achieve superior outcomes for our patients. I want to thank the SESC again for the honor of presenting the Henry L. Laws II lecture at the 2020 annual meeting of the SESC, and in doing so, I am hopeful that I have lived up to the standards set by Dr Laws during his long and productive career.

Author Note

Presented at the 2020 Annual Scientific Meeting of the Southeastern Surgical Congress.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

References

1. Dr. Henry L. Laws II. 2014. Dignity Memorial. Accessed February 24, 2014. https://www.dignitymemorial.com/obituaries/homewood-al/henry-laws-5871911
2. McKernan JB, Laws HL. Laparoscopic repair of inguinal hernias using a totally extraperitoneal prosthetic approach. *Surg Endosc*. 1993;7(1):26-28. doi:10.1007/BF00591232
3. Laws HL, Clements RH, Swillie CM. A randomized, prospective comparison of the Nissen fundoplication versus the Toupet fundoplication for gastroesophageal reflux disease. *Ann Surg*. 1997;225(6):647-654. doi:10.1097/00000658-199706000-00002
4. Definition of quality. (n.d.). Miriam-Webster. https://www.merriam-webster.com/dictionary/quality
5. Definition of quality. (n.d.). Business Dictionary. https://www.businessdictionary.com/definition/quality
6. Healthcare Quality. 2020. Wikipedia. Accessed January 11, 2020. https://en.wikipedia.org/wiki/health_care_quality
7. Definition of collaboration. (n.d.). Miriam-Webster. https://www.merriam-webster.com/dictionary/collaboration
8. Fung-Kee-Fung M, Watters J, Crossley C, et al. Regional collaborations as a tool for quality improvements in surgery: a systematic review of the literature. *Ann Surg*. 2009;249(4):565-572. doi:10.1097/SLA.0b013e31819ec608
9. Fink AS, Campbell DA, Mentzer RM, et al. The National surgical quality improvement program in non-veterans administration hospitals: initial demonstration of feasibility. *Ann Surg*. 2002;236(3):344-353. doi:10.1097/00000658-200209000-00011
10. Khuri SF, Henderson WG, Daley J, et al. Successful implementation of the department of veterans affairs' national surgical quality improvement program in the private sector: the patient safety in surgery study. *Ann Surg*. 2008;248(2):329-336. doi:10.1097/SLA.0b013e3181823485
11. ACS NSQIP Hospitals. (n.d.) American College of Surgeons. Accessed March 8, 2020. https://www.facs.org/search/nsqip-participants?allresults=
12. Campbell DA, Englesbe MJ, Kubus JJ, et al. Accelerating the pace of surgical quality improvement: the power of

hospital collaboration. *Arch Surg*. 2010;145(10):985-991. doi:10.1001/archsurg.2010.220

13. Englesbe MJ, Dimick JB, Sonnenday CJ, Share DA, Campbell DA. The Michigan surgical quality collaborative: will a statewide quality improvement initiative pay for itself? *Ann Surg*. 2007;246(6):1100-1103. doi:10.1097/SLA.0b013e31815c3fe5
14. Michigan Surgical Quality Collaborative. (n.d.). Michigan Surgical Quality Collaborative. Accessed March 9, 2020. https://msqc.org
15. Daley BJ, Cecil W, Clarke PC, Cofer JB, Guillamondegui OD. How slow is too slow? Correlation of operative time to complications: an analysis from the Tennessee surgical quality collaborative. *J Am Coll Surg*. 2015;220(4):550-558. doi:10.1016/j.jamcollsurg.2014.12.040
16. Lockett MA, Turley C, Gibbons L, et al. The South Carolina surgical quality collaborative: a new effort to improve surgical outcomes in South Carolina. *Am Surg*. 2018;84(6):916-919. doi:10.1177/000313481808400641