

Joanna Kotcher Fuller

# SURGICAL TECHNOLOGY



PRINCIPLES AND PRACTICE

SIXTH EDITION

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# SURGICAL TECHNOLOGY

PRINCIPLES AND PRACTICE

SIXTH EDITION

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# Preface

Shortly after the historical entry of operating room technician as a civilian allied health profession, *Surgical Technology: Principles and Practice* was introduced as the first and only textbook written by a certified surgical technologist and intended solely for the study of surgical technology. Since that time this textbook has been in continuous publication, with succeeding editions that paralleled the growth of the profession.

The sixth edition of *Surgical Technology: Principles and Practice* represents a long-term partnership between educators and students that spans more than 20 years. Throughout this period there have been striking advances in biotechnology and associated demands for professional development of the surgical technologist. The Association of Surgical Technologists was instrumental in creating structures for course accreditation through a number of collaborating agencies. *Surgical Technology: Principles and Practice* has been there to support students throughout the growth and development of the profession. It has kept pace with technological advances in the profession but also with a wider role in patient care. The surgical technologist today is not only a team player but also a decision maker, a role that requires greater demands on personal as well as technical skills. *Surgical Technology: Principles and Practice* continues to provide authoritative information in a manner that encourages students to think strategically and creatively as they face new professional challenges.

A number of new areas of study have been added to the surgical technology curriculum. This edition includes the most recent curriculum requirements with electronic resources for both students and instructors to make the transition smoother and to ensure that all material and references are authoritative and up to date.

Surgical technologists must be current in all aspects of government and professional standards related to safety. Patient and health worker safety has been a major focus in all editions of *Surgical Technology: Principles and Practice*. This edition provides the current standards, and includes the names and web addresses of the authoritative agencies and professional bodies that create the standards, so that students and instructors can be continually informed of any updates.

## WHO WILL BENEFIT FROM THIS BOOK?

This textbook has been written primarily for surgical technology students. The book's comprehensive approach covers all core content required for instruction in surgical technology programs that are accredited by both the Commission on Accreditation of Allied Health Education Programs

(CAAHEP) and the American Board of Health Education Schools (ABHES). Although primarily a student textbook, the progressive technical discussions and comprehensive approach make it a standard reference book for central processing staff, surgical nurses, medical students, and interns working or rotating through surgery.

## WHY IS THIS BOOK IMPORTANT TO THE PROFESSION?

*Surgical Technology: Principles and Practice* is an important work, not only because it was the first textbook written for and by a surgical technologist, but because it is based in sound evidence-based practice and a high level of scholarship. Textbook standards must be soundly based in responsible scholarship. For students and instructors, this means that information—no matter what the form—must be thoroughly researched and include sources of the information.

Standards of practice are established by the coordinated efforts of the many peer-reviewed professional and governmental organizations involved in medicine, nursing, environment safety, infectious disease, and patient protection. These practices are evidence-based. *Surgical Technology: Principles and Practice* presents these standards as the basis of practice using language and terms widely recognized by the medical and nursing community. One of the important goals of *Surgical Technology: Principles and Practice* has been to present facts and material without pretention or jargon—to make it accessible to students so they can achieve their personal career goals. The sixth edition continues in these traditions.

## NEW TO THIS EDITION

The sixth edition of *Surgical Technology: Principles and Practice* presents important new material required for the continuing growth of the profession. This edition contains all additions to the latest surgical technology curriculum. These topics have been integrated into existing chapters and include up-to-date references and resources for students and instructors.

New to this edition is a chapter on community disaster planning and response. This material was developed for surgical technologists as an accreditation requirement of CAAHEP. The chapter explains federal, state, and local disaster management structures and also presents an illustrative case study of a disaster. Internet-based resources are provided throughout the chapter so that students and instructors can easily access formal training programs in disaster response and also get more information on specific topics.

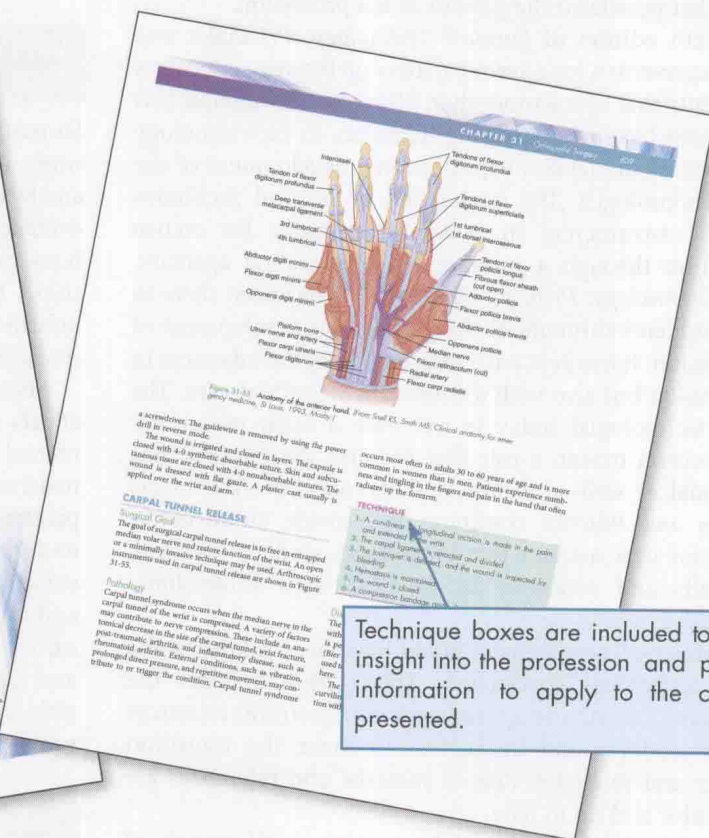
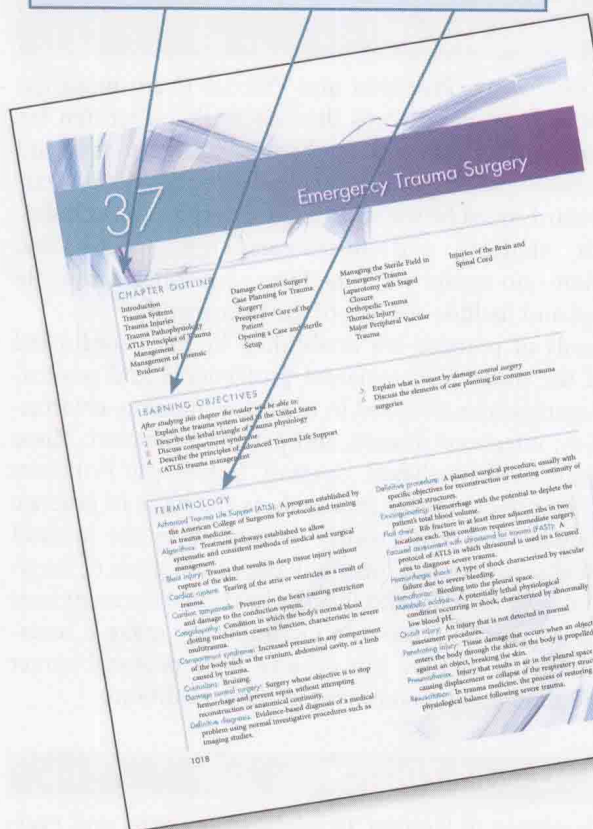


A new chapter on trauma surgery has also been added. This chapter synthesizes skills that students acquire in preparation for their work as surgical technologists, with new information on the methods and practices of trauma surgery. Most importantly, the chapter explains the principles that form the basis of trauma surgery and provides insight into how to apply previously learned skills into the trauma specialization.

Chapter Outlines, Learning Objectives, and Terminology, with glossary-style definitions at the beginning of each chapter, set the stage for student learning.

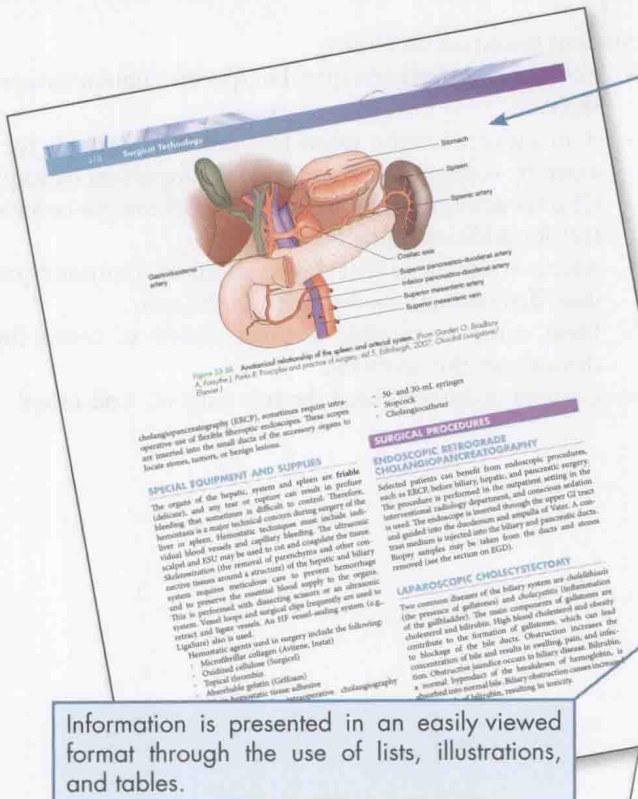
## LEARNING AIDS

A variety of pedagogical features are included in this text to aid learning:



Technique boxes are included to provide insight into the profession and practical information to apply to the concepts presented.

Dynamic, full-color figures provide visual connection and promote student involvement with the material.



**CHAPTER 11 Gastrointestinal, Genitourinary, and Endocrine**

**Table 11-7 Properties of Disinfectants**

Disinfectant	Level of Disinfection	ES	ES	ES	ES	ES	ES	ES	ES
Quaternary ammonium compounds (QACs)	Intermediate (70% to 90%)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Phenolic disinfectant compounds	Low	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Glutaraldehyde (2%)	High (critical item)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Stabilized hydrogen peroxide (5%)	High (critical item)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Formaldehyde (37% formaldehyde)	High	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Iodophor free iodine (2% disinfectant solution)	Intermediate to low (depending on concentration)	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quaternary ammonium disinfectants	Low (noncritical item)	No	Yes	No	No	No	No	No	No
Sodium hypochlorite (1% to 5% bleach)	Low (noncritical item)	No	Yes	No	No	No	No	No	No

**Orthophosphoric Acid (OPA)**  
Orthophosphoric acid (OPA) is a non-oxidizing, high-level disinfectant that can be used for heat-labile medical devices. Instruments and equipment are thoroughly cleaned, dried, and placed in the solution for 12 minutes. The items must be thoroughly rinsed with water three times. Items not properly rinsed will cause irritation of the eyes and nasal passages. Glutaraldehyde is toxic to tissue items that have been disinfected or sterilized in glutaraldehyde must be completely rinsed with sterile, distilled water before they are used on a patient.

**HIGH LEVEL DISINFECTION**  
High level disinfection (HLD) is a process in which most but not all microorganisms are killed with a liquid disinfectant. HLD does not usually destroy bacterial spores; therefore it is

## ANCILLARIES

### FOR THE INSTRUCTOR

#### Evolve

*Surgical Technology: Principles and Practice* offers several assets on Evolve to aid instructors:

- **Test Bank:** An Exam-View test bank of more than 1400 multiple choice questions that feature rationales, cognitive levels, and page number references to the text. This can be used as review in class or for test development.
- **PowerPoint Presentations:** One PowerPoint presentation has been developed for each chapter. These can be used as is or as a template to prepare chapter lectures.
- **Image Collection:** All of the images from the book are available as JPEGs and can be downloaded into PowerPoint presentations. These can be used during lecture to illustrate important concepts.

- **Text Answer Key:** All of the answers to the Review Questions from the text, along with talking points for the Case Studies.
- **Workbook Answer Key:** All of the answers to the Workbook exercises.
- **TEACH Instructors Resource:** Includes lesson plans, lecture outlines, and PowerPoint slides, all available via Evolve. The TEACH Instructors Resource provides instructors with customizable lesson plans and lecture outlines based on learning objectives. With these valuable resources, instructors will save valuable preparation time and create a learning environment that fully engages students in classroom participation. The lesson plans are keyed chapter by chapter and are divided into convenient lessons that break up the chapters logically. The Lesson Plans include a wide variety of classroom, online, and homework activities for students. In addition to the lesson plans, instructors will have unique lecture outlines in PowerPoint with talking

points, thought-provoking questions, and unique ideas for lectures.

## FOR THE STUDENT

### Student Workbook

The student workbook includes:

- Comprehensive review of terminology, anatomy, and chapter content that are reinforced by a variety of recall exercises.
- Application exercises that encourage students to put concepts into practice.
- Critical thinking exercises that take information to the next level and prepare students for the real world through patient case scenarios.

### Evolve

Student resources on Evolve:

- Skills Videos that correspond to specific content covered in the text.
- A mock certification exam that prepares students for the exam by testing their knowledge on important concepts.
- Chapter activities that provide review of content covered in text for additional practice.
- Archie Animations that show various anatomy and procedure demonstrations discussed in the text.
- Flash cards to provide a quick review of terms found throughout the textbook.
- Content updates to keep the text current. And more!





# Acknowledgments

Special thanks for this edition of *Surgical Technology* go to several key people who have been instrumental in the production of this edition. Jennifer Janson, Executive Content Strategist, has been associated with the text for many years and provided excellent oversight and major decision making. Kelly Brinkman, Senior Content Development Specialist, has been instrumental in managing the flow and organization of manuscript and artwork, and advising on content and organization. I would like to give special praise to Mary Pohlman, Senior

Project Manager, for implementing the layout of the text. Her expert design has improved readability while maintaining visual appeal in the text, making it much easier for the reader to match the text with the images. Mary's editorial expertise has also been a great help in completing this edition of the book. I would also like to acknowledge the consultant work of Julie Armistead, who has updated the ancillaries and provided consultation on curriculum requirements.

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## The Surgical Technologist

### CHAPTER OUTLINE

Introduction	Affiliated Organizations	Other Perioperative	Becoming a Health Care
Historical Evolution of the	Training and Certification	Responsibilities	Professional
Profession	The Role of the Surgical	Task Integration	Personal Attributes for
AST: The Association of	Technologist	Careers for Certified Surgical	Success
Surgical Technologists		Technologists	

### LEARNING OBJECTIVES

After studying this chapter the reader will be able to:

1. Understand the development of the role of the surgical technologist, including the organizations that support the profession
2. Describe the process of training and certification for the surgical technologist
3. Discuss the role of the surgical technologist
4. Discuss career opportunities available to the surgical technologist
5. Describe the attributes of a professional
6. List the personal attributes needed for success as a surgical technologist

### TERMINOLOGY

**ABHES:** Accrediting Bureau of Health Education Schools.

Organization that offers accreditation to higher education institutions.

**ACS:** American College of Surgeons. A professional organization that establishes educational standards for surgeons and surgical residency programs.

**Allied health profession:** A profession that follows the principles of medicine and nursing but that focuses on an expertise set apart from those practices.

**AORN:** Association of periOperative Registered Nurses. The professional organization for surgical nurses; originally known as the Association of Operating Room Nurses.

**AMA:** American Medical Association. Association founded in 1847 made up of medical doctors whose mission is to promote healthy lifestyles across all patient populations.

**ARC/STSA:** Accreditation Review Council on Education in Surgical Technology and Surgical Assisting. The ARC/STSA establishes, maintains, and promotes quality standards for education programs in surgical technology and surgical first assisting.

**ANSI:** American National Standards Institute. Organization that creates business and health standards to serve as a baseline for assessment.

**Assistant circulator:** The surgical technologist in the nonsterile role of the surgical team responsible for monitoring conditions in the operating room as related to patient care, safety, documentation, distribution of sterile supplies and counts. A registered perioperative nurse in this role would be considered a circulator and will have additional responsibilities.

**AST:** Association of Surgical Technologists. The professional association for surgical technologists that strives to uphold and support the standards of patient care and the profession.

**CAAHEP:** Commission on Accreditation of Allied Health Education Programs. Accredits health science programs, including those for surgical technology.

**Certification:** Acknowledgment by a private agency that a person has achieved a minimum level of knowledge and skill. Certification usually is established by graduation from an accredited institution and passing a written examination. Certification does not confer legal status.

**Continuing education:** More formally called *professional development*. It demonstrates an ongoing learning process in an individual's profession. Continuing education (CE) credits are provided by a professional organization. Credits are earned by attending lectures and in-service presentations or by study and examination. Usually only peer-reviewed professional literature qualifies for CE credits.

**CST:** Certified surgical technologist. A surgical technologist who has successfully passed the certified examination given by the National Board of Surgical Technology and Surgical Assisting.

**CST-CFA:** Certified surgical technologist–certified first assistant. A surgical technologist with advanced training who has successfully passed the certification examination for surgical first assistants and is credentialed by the National Board of Surgical Technology and Surgical Assisting.

**Licensure:** Professional status, granted by state government, that defines the limits (scope) of practice and regulates those who hold a license.



## TERMINOLOGY (cont.)

**National Certifying Examination for Surgical Technologists:**

A comprehensive written examination required for official certification by the Association of Surgical Technologists, developed by the NBSTSA.

**NBSTSA:** National Board of Surgical Technology and Surgical Assisting. The NBSTA (formerly the Liaison Council on Certification for the Surgical Technologist) is responsible for all decisions related to certification such as eligibility, renewal, and revocation, as well as developing the certification examination.

**NCCT:** National Center for Competency Testing. A nonprofit organization that provides a certification examination for nonaccredited programs and on the job training, and other trained surgical technologists whose programs are not recognized by the Association of Surgical Technologists.

**Nonsterile team members:** Surgical team members who handle only nonsterile equipment, supplies, and instruments. The circulator is the primary nonsterile team member.

**ORT:** Operating room technician. Former name for surgical technologists (name changed to *surgical technologist* in the early 1970s).

**Professional attributes:** Positive behaviors and traits of a professional, highly regarded by the public and professional peers. They include such traits as honesty, reliability, tact, diplomacy, and commitment to the profession.

**Proprietary school:** Private, for-profit school.

**Scrub:** Role and name commonly applied to the surgical technologist or licensed nurse in the sterile scrub role during surgery.

**Sterile personnel:** Members of the surgical team who have performed a surgical scrub or hand and arm antisepsis procedure. They don sterile gown and gloves and either perform the surgery or assist directly. Sterile personnel include the surgeon, assistant(s), and scrub. Other sterile personnel such as a scrub nurse, students, and preceptors may also be part of the sterile team.

**Surgical conscience:** In surgery, professional and personal honesty about one's actions, mistakes, and abilities.

## INTRODUCTION

Surgical technology is an allied health profession. Professionals in allied health follow the principles of medicine and nursing in that they participate in the health and well-being of people through specific tasks and expertise. However, allied health professionals have distinct expertise that is both humanistic and technical. Allied health professionals are highly trained and must have a global view of health, as well as the education and capability to focus on highly technical aspects of health care delivery. Other allied health professions include emergency medical technologists, nuclear medicine technicians, and specialists in the fields of medical physics, hemodialysis, bioengineering, dentistry, and respiratory therapy. In the past 2 decades, the number of allied health professionals has increased enormously, as have their educational requirements. Advances in technology and the need for specialist training have resulted in the development of new allied health professions and expanded the roles of those already in existence. Surgical technology has also followed this trend.

Whether the surgical technologist is trained in an intensive military program or through rigorous study and practice in a civilian health facility, the profession offers a variety of challenges and opportunities.

## HISTORICAL EVOLUTION OF THE PROFESSION

The profession of surgical technologist, as it is defined today, is developing as a result of rapid, monumental developments in technology in general. Advances in optics and digital technology especially have contributed to the highly complex equipment required for modern surgical procedures.

Surgeons have always needed skilled assistants, including those whose particular role was centered around surgical

instrumentation. Beginning with the development of effective anesthesia and antisepsis in the late 19th century, the role of the nurse in surgery has been well documented. In the late 1800s, she prepared instruments for surgery, and in the early 1900s, she assisted in surgical procedures and in the administration of ether, called "etherizing." Her duties from about the 1920s to the 1940s were those of today's circulator. She also instructed student nurses in their surgical education. Often the operating room supervisor was the only graduate nurse in surgery, and it was her duty to oversee the student nurses as they completed their rotation in surgery.

The need for assistive personnel in surgery did not arise until World War II. During World War I, Army corpsmen worked on the battlefield to offer aid and comfort to the wounded, but they had no role in surgery. World War II dramatically changed that. With the development of antibiotics, such as penicillin and sulfa, war surgeons could operate on and save the lives of many more patients than previously was possible. Technological advances also created a need for trained personnel who could assist the surgeon.

The increase in battlefield survivors created a drastic shortage of nurses. In addition to the nurses needed to staff the field hospitals, many more were needed at base hospitals. At home, extra nurses were trained to attend to the wounded who returned from battle. To supply the field hospitals in the Pacific and European theaters, the Army began training corpsmen to assist in surgery, a role that previously had been filled only by nurses. By this time, however, corpsmen were expected to administer anesthesia and also assist the surgeon directly during surgery.

When nurses were not available, such as on combat ships, corpsmen worked under the direct supervision of the surgeon. In this way, a new profession was born, and the Army called these corpsmen operating room technicians (ORTs). From this time on, the military played a significant role in refining



the position of the ORT. Each branch of the military provided specific training and job descriptions for the ORT, who received secondary training after becoming a medic.

After World War II, the Korean War caused a continued shortage of operating room nurses, and the need for fully trained nurses in the operating room was questioned. At this time, the operating room supervisors began to recruit former corpsmen to work in civilian surgery. Their primary function was that of a circulator. Registered nurses continued to fill the role of the scrub or "instrument nurse" until about 1965, when the roles were reversed. At this point, hospitals began training civilian ORTs.

In 1967, prompted by the need for guidelines and standards in the training of paramedical surgical personnel, the Association of Operating Room Nurses (AORN) published a book, *Teaching the Operating Room Technician*. In 1968 the AORN board of directors created the Association of Operating Room Technicians (AORT). Formal training for the civilian ORT began in proprietary schools across the United States.

Along with organizational independence came steps toward formalizing the technologist's education. The AORT created two new committees, the Liaison Council on Certification for the Surgical Technologist (LCC-ST) and the Joint Review Committee on Education. In 1970, the first certifying examination for operating room technicians was administered, and those who passed were given the title Certified Operating Room Technician (CORT). In 1973, the AORT became independent from the AORN, and the profession changed its title to Association of Surgical Technologists (AST). The certified technician became known as a certified surgical technologist (CST).

### AST: THE ASSOCIATION OF SURGICAL TECHNOLOGISTS

The AST is the surgical technologist's professional organization. The association supports students and graduate surgical technologists through its many services and publications. State assemblies and local chapters of AST link surgical technologists with their national association and provide forums for learning, discussion, and advocacy. The association is actively involved in training and curriculum development. At the national level, AST provides the following support to student and graduate surgical technologists, the public, and teaching institutions:

1. Maintains Practice Standards, Code of Ethics, and Code of Conduct for surgical technologists
2. Publishes a professional journal, *The Surgical Technologist*, which provides news, legislative updates, and articles for professional development
3. Holds annual conferences for surgical technologists and educators
4. Maintains a membership registry
5. Provides opportunities for continuing education (professional development)
6. Provides leadership, standards, and direction for the profession through its Standing Committees
7. Represents surgical technologists and advocates for standards of patient care through state and federal legislative bodies and the general public

8. Coordinates with the Accreditation Review Council on Education in Surgical Technology and Surgical Assisting (ARC/STSA) to establish educational standards for surgical technologists
9. Maintains regional and local chapters of the Association of Surgical Technologists
10. Provides academic scholarships through its foundation

It is important for surgical technology students to become active members of the AST and to promote the standards of the profession. Participation in conferences and educational seminars ensures that the high standards set by the organization are maintained through a process of continuing education and public awareness. Also, association with peers in the profession provides opportunities to share experiences and maintain current practices.

*The website of the Association of Surgical Technologists can be accessed at <http://www.ast.org>.*

### AFFILIATED ORGANIZATIONS

As a body of professionals, surgical technologists are supported by a number of key organizations and partners. Each has a designated role in promotion, certification, accreditation, and continuing education.

### ACCREDITATION REVIEW COUNCIL ON EDUCATION IN SURGICAL TECHNOLOGY AND SURGICAL ASSISTING (ARC/STSA)

The ARC/STSA provides educational standards and recommendations required for accreditation of programs in surgical technology and surgical first assisting. The ARC/STSA collaborates with the Commission on Accreditation of Allied Health Education Programs (CAAHEP), which accredits programs on recommendation of the ARC/STSA. Accreditation is granted to a school only after a full on-site evaluation of the program and its facilities to ensure compliance with ARC/STSA standards. This includes an evaluation of the courses that must adhere to an approved core curriculum.

The Accrediting Bureau of Health Education Schools (ABHES) is another nonprofit accrediting body. ABHES is recognized by the U.S. Department of Education as both an institutional and specialized accreditation body in health training and education. Its students may apply to take the AST certification examination.

*The ARC/STSA website can be accessed at <http://www.arcst.org>.*

### NATIONAL BOARD OF SURGICAL TECHNOLOGY AND SURGICAL ASSISTING

The National Board of Surgical Technology and Surgical Assisting (NBSTSA) (formerly the LCC-ST) oversees certification and credentialing of surgical technologists and surgical technologist-first assistants. The organization is responsible for the eligibility, granting, revoking, and denial of certification.