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Medical Education

American college of surgeons centennial: Historical accomplishment and programs

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1. Introduction

The American College of Surgeons (ACS), modeled after the ancient colleges of the British Isles, was first proposed by Dr Franklin Martin and established in May of 1913. In 1915, a Great Seal became the official insignia of the College and the seal has inscriptions of its motto as "To Serve All with Skill and Fidelity". Members of this professional organization are entitled to be listed as Fellows of the American College of Surgeons after their doctoral medical degree. A new Fellows logo was designed in 2003 with the added words of "Committed to Excellence".

Dr Martin was a prominent surgeon and a great leader who had the foresight to open a Chicago Post-Graduate Medical School in 1889 to offer training at a time of a rapid increase in specialist knowledge but no formal residencies. In 1905, Dr Martin also published an independent scientific journal, *Surgery, Gynecology & Obstetric* (*SGO*, later renamed as the *Journal of ACS*). It was "a practical journal for practical surgeons edited by active surgeons", rather than one directed by commercial interest. In 1910, Dr Martin and his colleagues invited *SGO* subscribers to come to his hospital for lectures, visiting clinics, and observing operating room demonstrations.

In 1912, Dr Martin put forward the idea of organizing future surgical education into a College of Surgeons, modeled after the Royal College of Surgeons of England, Ireland, and Scotland. In 1914, Dr Martin gave his final report on the requirements of a Fellowship to the ACS Regents and Fellows and recommended an experience-based standard instead of a written test.

During this year's centennial celebration, the ACS re-emphasized its mission as "Inspiring Quality: Highest Standards and Better Outcomes". Various articles, exhibitions, and books have been published [1,2]. Because membership of ACS included almost all the prominent academic and practicing surgeons globally, the historical records and ACS publications also reflected the development and progress of modern surgery. Highlights of the ACS programs, activities, and American surgical development are summarized in Tables 1 and 2.

In this paper, the numerous initiatives and accomplishments of this august organization are described in more detail under the following headings: (1) History of the first half of the 20th century; (2) Hospital standardization program; (3) Clinical congress for surgical education; (4) Graduate and posteducation; (5) College's cancer and trauma programs; and (6) Surgical quality improvement programs. Many of the programs and projects are inter-related and carefully initiated when new problems resulted from cultural, social, economical, political, and scientific changes developed over the years.

2. History of the first half of the 20th century

Due to Dr Martin's effort the ACS organization expanded greatly during national and international events from 1913 to the 1920s. During World War I, a Council of National Defense was established by law in August of 1916. The Council had an Advisory Commission composed of seven Presidential appointees drawn from academic, industrial, financial, labor, and medical civilians. As a Commissioner, Dr Martin oversaw every aspect of military preparation and served as a policy nerve center throughout the war.

Dr Martin had organized a 38-person Committee of American Physicians for Medical Preparedness, which included members of

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Table 1
Highlights of the American College of Surgeons (ACS) activities and American surgical development.

1913–1919	Setting standards for surgical practice Surgeons and physicians preparing for World War I
1920–1929	Establishing core programs of cancer and trauma care Imaging emerges as a way to diagnose disease
1930–1939	Breakthroughs in resection of tumors Raising bars on surgical standards
1940–1949	Better blood collection and processing Advances in military medicine
1950–1959	New frontiers of surgery: Repairing heart and transplanting organs
1960–1969	Revolutionary medical advances with balloons, bypasses, and artificial parts
1970–1979	Debuts of surgi-centers, national emergency system, self-assessment, and educational programs
1980–1989	Emergence of trauma standards, surgical robots, and minimally invasive procedures
1990–1999	ACS cancer registry became the largest in the world Advances in endovascular surgery
2000–2012	Expanding National Surgical Quality Improvement Program Promoting international surgical volunteerism

the armed forces, the Red Cross, the American Surgical Association, and the ACS. With the approval of President Wilson, this Committee was launched as a government sponsored entity. Its influence was greatly increased by enlisting 2000 Medical Reserve Officers and surveying the capacities of some 1700 medical institutions for possible involvement in the war effort. Dr Martin also was asked by President Wilson to organize field hospitals. He was assisted by other College leaders including the Mayo brothers, George Crile, William Halsted, and Evarts A. Graham. There were advances in the care of the war wound, such as the successful management of open chest wounds and empyema, and using plaster cast for fractures when splinting material was in short supply.

Following the Allied victory in 1918, Dr Martin returned to his multiple projects of the College. He had help from many individuals with enthusiasm and expertise. Notably Dr Earnest A. Codman of Boston, who established the first mortality and morbidity conference at the Massachusetts General Hospital. He also believed that: "Every hospital should follow every patient it treats long enough to determine whether or not the treatment has been successful, and to inquire: 'if not, why not?'." He declared that health institutions should maintain accurate records, be very transparent, and have a quality standard. In addition to his many fields of expertise such as diagnostic X-ray, anesthesia, and shoulder and duodenal ulcer disorders, Dr Codman originated the Bone Sarcoma Registry and pioneered the concept of end-result reporting.

In 1920, the ACS initiated sectional meetings as part of a nationwide effort to spread the ideals of the College and to help establish state and provincial chapters. In 2011, the Board of Regents approved the formation of the College's 36th international chapter: the ACS Portugal Chapter. This brings the total number of ACS chapters to 103: 36 international, two Canadian, and 65 American.

During World War II, ACS replaced its sectional meetings with War Sessions throughout the United States (US) and Canada, to teach the many physicians and surgeons who were about to enter the Army how to care for military wounds. Dr Edward D. Churchill was the Theater Commander for Surgery in the Mediterranean. He developed the use of delayed primary wound closure, early debridement of contaminated wounds, and improved the air evacuation process for treating wounded soldiers.

Table 2
History and activities of the American College of Surgeons (ACS) in the past century.

1905 - Dr Franklin Martin published the journal *Surgery, Gynecology & Obstetrics*
1910 - First *Clinical Congress of North American Surgeons* was held in Chicago
1912 - Dr Franklin Martin proposed to organize a *National Surgical College*
1913 - ACS had its first convocation in October
1917 - *Education Program of North American Surgeons* became *Clinical Congress*
1922 - ACS formed a *Committee on Treatment of Fracture*, now the *Committee on Trauma*
1924 - ACS published *The Minimum Standards of Hospital*
1926 - ACS published the first *Manual of Hospital Standardization*
1940 - Dr Owen Wagensteen proposed a *Surgical Forum* for the Clinical Congress
1959 - The *American Joint Commission on Cancer* (AJCC) was organized
1971 - ACS launched the *Surgical Education and Self-Assessment Program*
1977 - The AJCC published its *First Cancer Staging Manual*
1980 - ACS initiated the *Advanced Trauma Life Support* course
1990 - The *National Cancer Data Base* was established
2001 - The *National Surgical Quality Improvement Program* was established
2005 - ACS *Bariatric Surgery Center Network Accreditation Program* was established
2007 - The *National Trauma Data Bank* was established
2008 - The *National Accreditation Program for Breast Centers* was formed.
2011 - ACS launched the *Inspire Quality* project.

3. Hospital standardization program

At the 1912 Clinical Congress of Surgeons of North America, prior to the formation of the ACS, Dr Earnest A. Codman had proposed the concept of hospital standardization. In 1918, as part of the ACS hospitalization standardization program (created in 1917), the College started a process of voluntary, on-site hospital inspection based on Dr Codman's end-result idea. He stressed that hospital staff should follow every patient they treat to determine treatment success and failures. The ACS issued a single-page guideline *The Minimum Standards of Hospital* in 1924. At that time, most hospitals failed to meet minimum standard. In 1926, the ACS issued its first *Manual of Hospital Standardization*, an 18-page document.

The primary task of administering voluntary hospital accreditation by ACS was finally transferred in 1952 to the Joint Commission on Accreditation of Hospitals. This joint commission was officially founded following a proposal by Dr Evarts A. Graham. As Chairman of the ACS Board of Regents, Dr Graham also set out to put an end to fee-splitting. With the College Director Dr Paul Hawley, FACS (Hon) and the Regents, a press conference was held in 1952, where fee-splitting and its variation were declared as "dishonest and unethical".

In 1956, a Commission on Professional and Hospital Activities was established. This autonomous body, with multiple sponsors, was established to collect hospital case records for machine analysis to determine the incidences of disease in hospitals, the frequency of surgical procedures, and other valuable data to allow comparison of individual performance with national norms. In 1970, the first ambulatory surgery center, or "surgi-center" was opened in Phoenix, Arizona, USA. Surgi-centers have been shown to improve overall medical care and reduce costs.

In January 2007, the Joint Commission on Accreditation of Hospitals refreshed its identity by officially changing its name to The Joint Commission and adopted a new logo and tagline: "Helping health care organizations help patients". The Joint Commission's quality and safety improvement efforts therefore now extend well beyond the basic conduct of an accreditation process.

Today, The Joint Commission accredits more than 19,500 healthcare organization and health programs in the US, including more than 10,500 hospitals and home care organizations (covered 86% of US hospital beds) and more than 6500 other organizations that provide long-term care, laboratory, and ambulatory services. It certifies more than 2400 disease-specific care programs, primary stroke centers, and healthcare staffing services.

4. Clinical congress for surgical education

Starting in 1910, Dr Franklin Martin and his group had invited physicians to the *Surgeons of North America* clinical meeting in Chicago. "Various medical societies had arranged for six meetings during the two weeks. Papers and discussions will deal with the practical live subjects in surgery." It was very successful from the beginning, because over 1300 doctors had registered for 200 available tickets. In the program bulletin of 1913, it emphasized that special tickets were issued, limited to two per day for the morning and afternoon clinics. There was even a formal evening session when Dr Harvey Cushing of Boston reported on a series of 150 Gasserian ganglion operations.

In 1917, the name "Clinical Congress of Surgeons of North America" was shortened to just "Clinical Congress". In 1926, the College formed a Board on Medical Motion Picture Films [3]. Surgical training film sessions became an important teaching tool and both day and night sessions had become very popular at each Clinical Congress.

In 1940, Dr Owen H. Wangensteen proposed the establishment of an "idea-and-research" exchange forum for young surgeons. This resulted in the debut of the "Forum on Fundamental Surgical Problems" during the 1941 Clinical Congress. These Surgical Forums promoted basic laboratory researches and emphasized unique, new ideas ahead of its time. A program book with detailed abstracts has been published every year.

All activities of the College depend on the thousands of Fellows who serve on committee, commissions, and councils throughout the world. Presentations at the yearly Clinical Congress and publications in the *Journal of ACS* represented all aspects of progress and development of all surgical specialties in America and beyond.

The educational and training programs of the Clinical Congress have continued to the present day as the College's premier annual meeting. More than 10,000 surgeons, physicians, and medical personnel have registered at each meeting. It is the biggest and most important surgical conference in North America. The hallmark of the Clinical Congress has been premier hands-on learning, named professorial lectures, up-to-date clinical findings, films of complex operations, leading-edge basic and clinical research, and exceptional peer access.

The date of the ACS Clinical Congress has been set as the second week of each October, and the venue has been rotated every 3-year in sequence from San Francisco, to Chicago, and to the East Coast. Atlantic City was the East Coast meeting site until the casinos moved in, after which the ACS meeting has been held in various Eastern cities. Washington DC will be the site for the 2013 Clinical Congress from October 6th to October 9th.

5. Graduate and postgraduate medical education

As early as 1919, ACS published a *Manual on Newly Revised Criteria for Graduate Training in Surgery*. Many more hospitals then started to create surgical residency programs. In 1937, the Clinical Congress had a special session on "Accreditation of Hospitals for Graduate Medical Education". The same year, the American Board of Surgery, an independent not-for-profit organization, was created following a proposal by Dr Evarts A. Graham. The Board aims to set high standards of quality for graduate medical education and to establish a certification process and national certifying body for US surgeons. Minimal standards for surgical residencies were set and field surveys of training programs were initiated.

During these early years, there was some competition and rivalry between the ACS and the American Medical Association (AMA). The AMA established "Essentials for Approved Internships" in 1919 and began approval of residency programs in 1927 (Table 3).

Table 3
History of the American Medical Association (AMA).

1847	AMA was first organized
1919	AMA established *Essentials for Approved Internships*
1927	AMA began approval of residency programs
1939	AMA established the *Committee on Internal Medicine*
1950	AMA established the *Committee on Training in Surgery*
1951	First national *Intern Matching Program*
1952	First national *Resident Matching Program*
1970	*American Board of Medical Specialties* was formed

The AMA established a Committee on Internal Medicine in 1939 and a Committee on Training in Surgery in 1950. The disagreement and competition final resolved in the formation of the Resident Review Committee (RRC) in 1953. The RRC for surgery was established as a collaboration of the ACS, the American Medical Association, and the American Board of Surgery.

In 1971, the ACS launched the Surgical Education and Self-Assessment program. This program enabled surgeons to judge and enhance their knowledge in the broad area of general surgery. The first software version appeared in 1988, and the 10th edition included a CD-ROM with multimedia, more interface, voice narration, and Medline for journal references [4]. Currently in its 12th edition, the Surgical Education and Self-Assessment program has become a very useful continuing medical education tool and for the renewal and maintenance of surgeons' recertification.

In 1981, the Accreditation Council of Graduate Medical Education was established with a mission to improve healthcare and advance the quality of resident physicians education through accreditation. This Council has five members, one each nominated from the following five national organizations: AMA, American Hospital Association, Association of America Medical Colleges, Council of Medical Specialty Societies, and American Board of Medical Specialties. The American Board of Medical Specialties is the umbrella organization of 24 member boards of specialties and subspecialties.

The work of the Accreditation Council of Graduate Medical Education has been carried out by the RRC. Currently, the RRC consisted of 27 representatives appointed by the AMA, the appropriate specialty boards, and the national specialty organizations.

President Lyndon B. Johnson signed the groundbreaking Medicare law in 1965. This new legislation established a national social insurance program, administered by the government for elderly Americans. In 1985, ACS Regent Dr George F. Sheldon testified before the Senate about the dangers of restricting funding for graduate medical education as a way to save Medicare dollars. Subsequently GME funding was granted for 5 years of surgical specialty training instead of 3 years as proposed in the draft budget.

6. College's cancer and trauma programs

6.1. The Commission on Cancer

As early as 1913, the ACS collaborated with the American Society for the Control of Cancer (now the American Cancer Society) to spread the message of early detection and treatment advances by publishing one of the first articles for the public in the *Ladies Home Journal*.

In 1920, the first cancer registry in the USA, the Bone Sarcoma Registry, was started by a committee organized by Dr Earnest A. Codman to advance the concept of end-result reporting. In 1922, the College established the Committee on the Treatment of Malignant Diseases with Radium and X-Ray, which would later become the Commission on Cancer (COC).

In 1931, the College initiated surveys of cancer programs in hospitals and accredited the first hospital to ensure that the

structure and process necessary for quality cancer care were in place. The American Joint Commission on Cancer (AJCC) was organized in 1959 to develop a cancer staging system for selecting the most effective treatment, determining prognosis, and continuing evaluation of cancer control measures. A collaborative effort between the AJCC and the International Union for Cancer Control maintains the system that is used worldwide. The AJCC published its first *Cancer Staging Manual* in 1977. The most recent seventh edition was published in 2010.

In 1989, the ACS and the American Cancer Society jointly formed the National Cancer Data Base. This program collected data from all COC accredited hospitals and has captured 75% of all newly diagnosed cancer cases in the US. It has become the largest clinical cancer registry in the world. Various Cancer Program Practice Profile reports have been published, which will provide the 1420 approved cancer programs in 50 states with information to assess local therapies. The report allows COC physician volunteer surveyors to promote standards for quality multidisciplinary cancer care. In addition, the reports support the College's effort to develop effective educational intervention to improve cancer care outcome. The COC has established 13 Disease Site teams to meet the national demand for ongoing assessment of the quality of cancer care and to conduct research using National Cancer Data Base resources.

The US lags behind European countries in establishing breast centers to care for benign and malignant breast conditions. In 2005, after ACS pioneered accrediting cancer, trauma, and bariatric centers, a consortium of interested organizations began to discuss about forming a new entity. The National Accreditation Program for Breast Centers was formed in 2008 [5]. The program is governed by a multidisciplinary board, which includes physicians, other healthcare professionals, and representatives from 20 organizations. Each breast center must undergo a rigorous evaluation and review of its performance and compliance with the National Accreditation Program for Breast Centers standards. To maintain accreditation, centers must undergo an on-site review every 3 years.

In 2011, new accreditation standards for cancer centers were released by the COC calling for a patient-centered approach that enabled cancer patients to become partners in their own care and bring quality care close to home. In addition, the new standards require COC hospitals to reach specific performance levels of quality for treating patients with breast, colon, and rectal cancers. These standards have gained widespread support from the national cancer community.

In order to support full patient participation, the Patient Education Advisory Committee of ACS has planned programs, set guidelines, and developed a website to provide patients with the education and skills necessary to contribute effectively in their own care [6]. Standardization and enhancement of patient education will support the entire surgical team to reduce complication and improve patient outcome.

6.2. The Committee on Trauma

In 1922, Dr Charles L. Scudder formed an ACS Committee on the Treatment of Fracture. This committee later evolved into the Committee on Trauma (COT). The COT aims to achieve improvements in all phases of the care of the injured and in prevention of injuries. The COT is supported by a network of 65 State Committees, 11 International, and five Military Committees. Combined, these committees are composed of about 2200 members, the majority being Fellows of ACS.

In 1972, Dr David R. Boyd testified before the US Congress about the need for an Emergency Medical Service (EMS) system, wrote the pertinent clinical portion of the EMS Systems Act of 1973, and led efforts to fund and implement the new system in 1974. Thus, after 1974, a nationwide EMS system was implemented in USA.

In 1976, guidelines for developing Levels I, II, and III trauma centers were established. The COT first began establishing trauma care standards in 1979. In 1987, the COT developed the first standard of a trauma center verification program to ensure trauma care capability and institutional performance at its verified facilities. In 1980, the College's COT launched its *Advanced Trauma Life Support* course when the famous baseball pitcher Tommy John had a plane crash.

In keeping with the mission of improving trauma care, COT has developed a national registry for trauma center data. In 2005, the registry contained data on approximately 1.5 million trauma patients. Each year the requirements for data submission became more stringent. With improved quality and reliability, the National Trauma Data Bank (NTDB) was established in 2007, with the publication of its first annual report in 2008. There were 435 hospitals participating in 2008, which increased to 744 in 2012. The 2012 annual report of NTDB is the largest aggregation of US and Canadian trauma registry data ever assembled. It is based on 773,299 records with valid trauma diagnosis submitted in 2011 from 720 hospitals. The hospitals included 228 Level I, 251 Level II, and 210 Levels III and IV trauma centers; an additional 31 are Level I or II pediatric-only centers.

In 2007, the Lundstahl Regional Medical Center in Germany, an overseas military hospital operated by the US Army and the Department of Defense, became the only hospital outside the US to achieve Level II Trauma Center verification status. In 2011, it was verified as a Level I center.

Patients treated at verified trauma centers have lower mortality rates than those treated at undesignated hospitals. In fact, after adjusting for differences in the case mix, the National Study on the Costs and Outcomes of Trauma showed that one is 25% more likely to live when care is provided at a Level I trauma center than when it is provided at a nontrauma center [7].

Thus the COT can use the infrastructure of its NTDB to provide feedback to participating trauma centers in a new Trauma Quality Improvement program. As of 2011, there are 111 trauma centers participating in the Trauma Quality Improvement program, including 74 Level I and 37 Level II centers.

7. Surgical quality improvement programs

The ACS has a Division of Research and Optimal Patient Care. Because quality improvement in healthcare is the professional responsibility of ACS, the Division of Research and Optimal Patient Care has three major units to implement this mission: Trauma, Cancer, and Continuous Quality Improvements. In addition to the cancer approvals and trauma verification programs described above, the Bariatric Surgery Center Network Accreditation (BSCN) program was established in 2005.

In 2006, the centers for Medicare and Medical Services said it would only reimburse bariatric surgery procedures performed at a Level I ACS BSCN or American Society of Bariatric Surgery accredited center. In 2010, a report showed that Medicare patients who underwent bariatric operation at the Level I ACS BSCN accredited hospitals benefited from a shorter length of stay and lower overall complication rates [8].

In 1998, the Department of Veterans Affairs' hospitals reported on the first nationally validated, outcome-based, risk-adjusted, and peer-controlled program for the measurement and enhancement of the quality of surgical care [9]. In 2001, with grant support from the Agency for Healthcare Research and Quality, the ACS introduced its own copyrighted National Surgical Quality Improvement Program (ACS NSQIP) and extended it to private hospitals all over the US. The

ACS NSQIP has been described as the "Best in the Nation" by the Institute of Medicine. It provides a prospective, validated database of preoperative to 30-day postoperative surgical outcomes based on clinical data collected by each hospital. ACS NSQIP is the only national program that is proven to improve patient outcome by reducing preventable complications across all surgical specialties. Currently, more than 500 institutions participate in the program and many have reported significant improvements in quality and cost savings.

A study in 2009 reported evaluations of 118 hospitals that participated in ACS NSQIP between 2005 and 2007, and showed that such hospitals each prevented 250–500 complications, saved 12–36 lives, and reduced costs by millions of dollars annually [10].

As early as 1999, several centers and programs under the US Department of Health and Human Services published a Guideline for Prevention of Surgical Site Infection. A later study of healthcare associated infections estimated that surgical site infection (SSI) accounted for 22% of such infections and SSI accounted for 8% of hospital deaths. In a 2013 report from the Mayo Clinic's Rochester Hospital, their staff used their own ACS NSQIP data to design a preoperative and operative colorectal bundle of steps to decrease SSI after colorectal surgery. One year after implementation of their colorectal bundle, their overall SSI rate of 9.8% for 2009 and 2010 was significantly decreased to 4% in 2011 ($p < 0.05$). The superficial SSI was also decreased, from 4.9% to 1.5% [11].

In 2011, the College launched another new national "Inspiring Quality" initiative to drive awareness of its quality programs and to help lead efforts to improve the quality and value of the nation's healthcare. Internationally, the College established the Giving Back program in 2004 to make use of the surgical community's passion, skills, and humanitarian spirit to serve the medically under-served effectively. By 2010, more than 1525 surgeons had enrolled in this volunteerism initiative.

8. Concluding remarks

For nearly a century, the ACS, the largest scientific and educational organization for surgeons of all specialties, has developed and operated leading programs. From hospital standardization, graduate and postgraduate training, continuing clinical educations, ACS has helped surgeons to maintain the highest standard of practice. From cancer, trauma, and bariatric programs to data banks and registries, ACS's surgical quality initiatives have been shown to measurably improve the quality of care, prevent complications, reduce costs, and save lives.

For the future, ACS has said it will continue to inspire quality and to lead the way to improve care for another 100 years. From its own experiences, ACS has discovered four key principles and mechanisms for growth: (1) identify and set standards for individualized care; (2) build the right infrastructure; (3) collect robust data to search for better care; (4) verify through a third party so hospitals and providers can respond proactively to those findings.

For more information, please visit www.facs.org/quality.

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