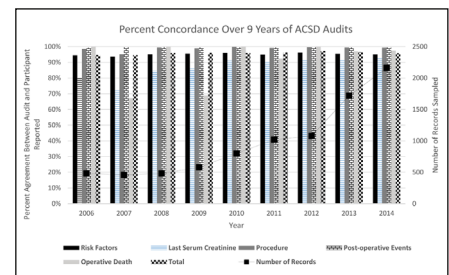


The Society of Thoracic Surgeons Adult Cardiac Surgery Database: The Driving Force for Improvement in Cardiac Surgery

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Initiated in 1989, the Society of Thoracic Surgeons (STS) Adult Cardiac Surgery Database (ACSD) includes more than 1085 participating centers, representing 90%-95% of current US-based adult cardiac surgery hospitals. Since its inception, the primary goal of the STS ACSD has been to use clinical data to track and improve cardiac surgical outcomes. Patients' preoperative risk characteristics, procedure-related processes of care, and clinical outcomes data have been captured and analyzed, with timely risk-adjusted feedback reports to participating providers. In 2006, STS initiated an external audit process to evaluate STS ACSD completeness and accuracy. Given the extremely high inter-rater reliability and completeness rates of STS ACSD, it is widely regarded as the "gold standard" for benchmarking cardiac surgery risk-adjusted outcomes. Over time, STS ACSD has expanded its quality horizons beyond the traditional focus on isolated, risk-adjusted short-term outcomes such as perioperative morbidity and mortality. New quality indicators have evolved including composite measures of key processes of care and outcomes (risk-adjusted morbidity and risk-adjusted mortality), longer-term outcomes, and readmissions. Resource use and patient-reported outcomes would be added in the future. These additional metrics provide a more comprehensive perspective on quality as well as additional end points. Widespread acceptance and use of STS ACSD has led to a cultural transformation within cardiac surgery by providing nationally benchmarked data for internal quality assessment, aiding data-driven quality improvement activities, serving as the basis for a voluntary public reporting program, advancing cardiac surgery care through STS ACSD-based research, and facilitating data-driven informed consent dialogues and alternative treatment-related discussions.

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Society of Thoracic Surgery Adult Cardiac Surgery Database's Audit Findings (2006 - 2014).

Central Message

The STS database is a paradigm-shifting innovation providing participants with opportunities to improve current and future care quality.

Perspective

The STS database has been a powerful, paradigm-shifting, disruptive innovation in healthcare. STS ACSD-participating cardiothoracic surgeons receive customized reports with comparisons of their local performance to national benchmarks. STS ACSD has enabled cardiac surgeons and their heart team members to use highly credible clinical data in order to assess and improve the quality of care provided. Moreover, STS ACSD affords a dynamic, high quality, and comprehensive resource for clinical and health policy research. Using STS ACSD, surgeon participants actively advance the forefront of knowledge, leaving a legacy for the future generations of cardiac surgeons.

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PURPOSE

Over the past 25 years, there has been increasing emphasis on using data-driven approaches to identify, monitor, report, and improve the quality of care provided within hospitals and health care delivery systems. Cardiothoracic surgery has consistently been at the forefront of this evolutionary paradigm. This News and Views article provides a brief summary of the historical development and continuing innovations of the Society of Thoracic Surgeons' (STS) Adult Cardiac Surgery Database (ACSD). We also highlight approaches used to validate the integrity of STS ACSD data, which are unparalleled in the health care industry and include documentation of completeness, accuracy, and reliability. These externally validated, highly accurate clinical data have been used for a variety of purposes, including development of sophisticated risk-adjustment models and performance metrics; feedback of benchmarked results to STS ACSD participants; data-driven quality improvement activities; research; government collaborations (eg, device registries for postmarket surveillance); and data-based, patient-specific informed consent and counseling.

HISTORICAL BACKGROUND

For nearly 3 decades, cardiothoracic surgery has been the national leader in clinical data registries, risk adjustment, performance measurement, and data-driven quality improvement.¹ Both the Department of Veterans Affairs (VA) and STS began their activities in these areas in 1986, on separate but parallel and similar tracks. In 1986, Congress mandated that the VA must compare risk-adjusted mortality rates for cardiac surgery with national standards (Public Law 99-166). Created in 1987, the first nationwide quality improvement national database initiative was started within the VA and was titled as "Continuous Improvement in Cardiac Surgery Program" (CICSP).² Rather than minimally complying with this new law's modest reporting requirements for risk-adjusted outcomes and comparative reporting, the CICSP ushered in a new quality assurance era by producing meaningful local VA cardiac surgery program-based performance reports.³

Initiated in direct response to Health Care Financing Administration's (HCFA, the predecessor of the Centers for Medicare & Medicaid Services [CMS]) release of inadequately risk-adjusted hospital

mortality reports, the STS data registry initiative also began in 1986. Following this flawed HCFA data release, STS was inundated by requests for program quality reviews. The STS issued a statement of concern in October of that year, starting an ad hoc Committee on Risk Factors for Coronary Artery Bypass Surgery.⁴ In their 1988 report, STS Committee members emphasized the need to identify and adjust for all risk factors that were predictive of operative mortality to make appropriate statistical comparisons. A data working group led by Dr Richard Clark was established, and the STS database was initiated in 1989.⁵ The fundamental goal of these early activities was to provide clinically relevant, timely, accurate, and reliable information to STS database participants to facilitate their local self-assessment and self-improvement activities.⁶⁻⁸ By 2013, STS ACSD included 1085 participating sites, representing 90%-95% of existing US-based adult cardiac surgery programs.

DATABASE INITIATIVES

Since its inception, a key objective of the STS ACSD was to assure that the important risk factors affecting outcomes were captured. This process always involves a balance between collecting all risk factors that are even potentially clinically relevant, which is costly and time consuming, vs collection of fewer key data elements (or relying on some administrative or electronic health record [EHR] data), which reduces data collection burden but potentially excludes robust adjustment for less common but important factors.^{9,10} By the mid-1990s, STS ACSD standardized data capture forms with uniform definitions (including case-based training sample sets) were distributed, and numerous training opportunities were available for data managers and coordinators. Given the special focus placed on prospectively inputting high-quality and complete local-site data, new programs were instituted to assure data completeness and quality (described later).^{11,12}

The power of STS ACSD became increasingly evident to local surgeon participants. As a return on their own local site's investment, STS providers received valuable feedback from STS ACSD, helping them understand their operative and perioperative processes and outcomes and to facilitate local quality assurance and improvement activities.¹³

In 1999, the Duke Clinical Research Institute (DCRI) was awarded the STS contract for database warehousing, analysis, and reporting. The DCRI

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