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Invited Editorial

Abstraction Techniques for the STS National Database

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Since 1964, the Society for Thoracic Surgeons (STS) has grown to represent over 7300 clinical and non-clinical professionals in cardiothoracic surgery who are dedicated to quality improvement and patient safety (1,2). As an initiative to improve quality, the STS National Database was instituted in 1989 and collects data from over 90% of the United States' cardiac surgery centers (2). The Adult Cardiac Surgery Database (ACSD), General Thoracic Surgery Database (GTSD), and Congenital Heart Surgery Database (CHSD) are three major components of the STS National Database that provide participants with valuable information on surgical outcomes (3–5).

Zozus et al. describes abstraction as the summary of patient data for a precise secondary use (6). Due to their unique clinical expertise, perfusionists are often called upon to abstract pre-, intra-, and/or postoperative data for the STS National Database. However, information outlining the complexity involved with performing data abstraction tasks in addition to clinical duties remains scarce. Abstracting required data variables (or data elements) such as preoperative medications or risk factors used to take minimal time and effort, but in recent years it has gradually become an intricate job that requires ongoing education and meticulous attention to details to ensure data elements are abstracted properly in accordance to STS National Database guidelines. A conceivable cause is the significant growth the database has experienced since its inception. This growth is demonstrated in part by an increase in the number of captured data elements per case, methodical expansions to the definitions of individual data elements, advancements in computer technology particularly in the area of operating systems, and substantial upgrades to database management systems from STS-approved software vendors (7,8). In light of these developments, it is imperative for perfusionists to also adapt in their data abstraction practices to preserve their role in facilitating quality outcomes as both informed clinicians and accurate data abstractors. The following review of the STS data abstraction process is intended to provide new and current data abstractors in the perfusion field with tools for developing or improving their skills.

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DATA ABSTRACTOR ROLES

Before beginning the abstraction process, it is important to understand all the tasks involved in generating various outcome reports provided by the STS (9). For the purpose of this review, data quality tasks are described and separated into five separate roles: data abstraction, database entry, data auditing, database management, and report dissemination. Some data abstractors have more than one role and/or task according to the individual needs of the institution participating in the STS National Database (Table 1). Nonetheless, thoughtful execution of each task is essential to obtaining painstakingly accurate outcome reports used to evaluate quality care.

DATA MANAGER EDUCATION

After determining a role, the STS's official website (STS.org) can be used to navigate to the Data Manager Education page (10). Here, the STS provides a comprehensive training module covering every procedure involved with participating in the STS National Database. It is approximately 45 minutes long, and enables the user to progress through the content at their pace and review specific procedures as necessary. In addition, the video provides detailed step-by-step instructions with

Table 1. Summary of data abstraction roles separated into five distinct categories.

Data abstraction
Preoperative data collection (e.g., history and physical, cardiac presentation, medications, up to the time patient enters the operating room)
Intraoperative data collection (e.g., intubation, skin incision time, blood usage up to the time patient exits the operating room)
Postoperative data collection (e.g., extubation time, peak glucose, complications up to hospital discharge date and time)
Verify the patient's 30-day status post-surgery (alive, dead, or unknown 30 calendar days after date of surgery by office visit, phone call, lab work, etc.)
Database entry
Input completed episode of care data sheets into database
Upload quarterly harvest data file(s) to the STS
Review and correct/clean data using the data quality report, missing elements, completeness/correctness, etc.
Data auditing
Perform regular data quality audits on abstracted charts
Provide performance feedback to clinical data abstractors
Use audit reports to track reduction in errors
Demonstrate department needs to medical staff and administrators using audit reports
Database management
Provide and/or coordinate training for data abstractors with clinical and non-clinical backgrounds
Consult data abstractors requesting clarity with clinical questions regarding data elements or definitions
Participate in continued education opportunities for database management (meetings, conference calls, webinars, etc.)
Report department needs and improvement areas to medical staff and administrators using audit reports
Report dissemination
Disseminate reports to physicians, administrators, abstractors, etc. as they become available
Explain outcome reports to physicians, administrators, abstractors, etc.
Generate hospital-specific outcome reports (e.g., STS risk adjustments, blood utilization stats, length of stay, or case volume reports)
Present results during periodic cardiovascular service meetings, morbidity and mortality conference, etc.

visual-aids on navigating STS.org to locate data management resources (10).

DATABASE COLLECTION TOOLS

To start the abstraction process, the most recent annotated Data Collection Form (DCF) should be obtained from the corresponding database. The Training Manual and Frequently Asked Questions (FAQ) document are also needed, and as of this review, these tools have been combined into one document for the most recent versions of the ACSD, GTSD, and CHSD. When answers to clinical questions are not available in the FAQ, the *Clinical Question Submission Form* can be used to gain further insight into data element definitions (11). However, timely data abstraction is crucial as it can take up to 30 days to receive responses to clinical questions. Some other notable abstraction resources include surgeon worksheets, anatomic diagrams, and quick reference sheets to simplify the data collection process (3–5,10). Additionally, Regional Group Activities, bimonthly *STS National Database News*, and the Advances in Quality & Outcomes meeting are more useful data collection tools for data managers (12–14).

STANDARDIZATION OF ABSTRACTION LOCATIONS

A DCF can be used as a means to obtain a cohesive agreement between data abstractors, clinical professionals, physicians, and administrators on the chosen locations for abstracted data elements. For example, a department may agree to abstract surgical skin incision start time only from the intraoperative surgical report, or only record the patient's intubation time from the anesthesia record. This is especially helpful when there are multiple locations from which a data element can be abstracted comparable to a patient's height and weight. It is important to note that, occasionally, data elements may not be present in optimal abstraction locations for various reasons, but a hierarchy diagram could be used to demonstrate preferred abstraction locations to maintain consistency.

There are several benefits to standardizing abstraction locations. One is the ability to concisely identify errors in data abstraction processes, and to assess whether a change in abstraction practice was effective in preventing the error from reoccurring. Another allows data managers to provide feedback to physicians on improving clinical documentation to meet the criteria to abstract a data element for the STS National Database. For instance, to capture whether a patient had a family history of premature coronary artery disease (CAD) in the ACSD, the abstractor must locate documentation of a direct blood relative with premature CAD occurring in males less than 55 years old or females less than 65 years old (15). Ultimately, abstraction locations should be reviewed for agreement with STS guidelines as often as database forms are updated.

DATA QUALITY REPORTS

The STS harvests' participant data four times a year for the ACSD, and only twice a year for the GTSD and CHSD (16). The STS requires approved software vendors to provide database participants with auditing tools for checking the completeness and accuracy of entered data. This facilitates the resolution of data quality issues prior to receiving a detailed Data Quality Report (DQR) from the STS during harvest time frames (17). Besides using auditing tools to amend missing data or completion issues, software vendors are also required to allow participants to build general reports based on their data (17). These reports can help data managers identify problems with the data that may not be recognized by the software vendor's

auditing utility. For example, creating a report for the total number of hours all ACSD patients in a particular harvest window spent intubated after leaving the operating room may reveal an unusual outlier. After reviewing that record, it could be discovered that the wrong day was used to capture the extubation date of the patient. Training on using the DQR is available on the Data Manager Education page on STS.org (10). Further questions regarding the DQR can be referred to the participants' clinical data specialist (18).

APPLICATIONS OF STS DATA IN PERFUSION DEPARTMENTS

Although the STS abstracts clinical data elements widely pertinent to cardiothoracic surgeons, there are many practical applications of STS data in perfusion departments. One is the ability to use STS data to discuss how perfusion practices may affect patients in the postoperative period with respect to measured parameters from the ACSD such as bleeding, glucose levels, and blood product usage. Another direct application employs the STS clinical practice guidelines to generate discussions on potential quality improvement areas in the perfusion department (19). This is particularly achievable by reviewing existing articles on clinical practice guidelines for blood conservation as well as temperature management on cardiopulmonary bypass (CPB) (20,21). Finally, for perfusion departments desiring STS data elements more applicable to CPB, participation in the Adult Cardiac Anesthesia Module captures variables such as the use of retrograde autologous priming of the CPB circuit, total crystalloid volume, use of hemofiltration on CPB, and the need to use inotropes or vasopressors to wean from CPB (22).

SUMMARY

Despite significant growth to the STS National Database, perfusionists can continue to abstract clinical data accurately and efficiently without sacrificing optimal performance in their clinical duties. Understanding the significance of the various roles involved with generating accurate outcome reports empowers perfusionists to choose the best way to contribute their unique skills to data quality initiatives within their programs. The online training module on STS.org is a vital tool for data abstractors to learn or review the intricacies of STS National Database participation from start to finish. By using the resources provided by the STS, perfusionists will continue to have a profound impact on the integrity of outcome reports well into the future.

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