REPORT FROM THE STS NATIONAL DATABASE WORK FORCE:

Clarifying the Definition of Operative Mortality

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Abstract

Several distinct definitions of postoperative death have been used in various quality reporting programs. Some have defined a postoperative mortality as a patient who expires while still in the hospital, while others have considered all deaths occurring within a predetermined, standardized time interval after surgery. While if continues to collect mortality data using both these individual definitions, the Society of Thoracic Surgeons (STS) believes that either alone may be inadequate. Accordingly, the STS prefers a more encompassing metric, Operative Mortality, which is defined as (1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days; and (2) all deaths occurring after discharge from the hospital, but before the end of the thirtieth postoperative day. This manuscript provides clarification for some uncommon but important scenarios where the correct application of this definition may be problematic.

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Mortality is the most commonly assessed outcome in healthcare. Definitions of mortality have differed according to the specific disease or condition, the reporting entity, and data availability. The two most common definitions are in-hospital death, which is easily and accurately collected, but which may be impacted by local transfer practices and the availability of post-discharge extended care; and mortality within a standardized time frame (e.g., 30 days) following admission or procedure. The latter is advocated by the American Heart Association's Standards for Statistical Models Used for Public Reporting [1]. This approach is less impacted by differences in local post-acute care facilities and it also mitigates the potential for gaming through postoperative transfer of critically ill patients to another facility. The major disadvantages of 30-day mortality reporting are the loss of those deaths that occur after 30 days but within the index hospitalization; the difficulty and expense associated with accurate collection of such data; and the need for very precise definitions of critical time points, the major focus of this brief report.

Recognizing the advantages and disadvantages of these individual definitions, the Society of Thoracic Surgeons (STS) believes that each, used in isolation, is inadequate. As the primary mortality metric for its provider feedback and voluntary public reporting initiatives, STS employs a more inclusive definition that encompasses all the patients who would be defined by *either* in-hospital or 30-day mortality. This metric is Operative Mortality, and it is currently the most frequently reported outcome measure used by STS. The purpose of this manuscript is to clarify the definition of Operative Mortality used by STS.

Current Definitions

The STS Congenital Heart Surgery Database tracks three mortality metrics, utilizing the following definitions [2, 3, 4]:

1. Mortality Status At Hospital Discharge

    "Indicate whether the patient was Alive or Dead at date and time of "Date of Hospital Discharge" for this operation."

2. Mortality - 30-Day Status

    "Indicate whether the patient was alive or dead on the 30th day post surgical procedure whether in hospital or not."

3. Mortality - Operative Death

    "Operative Mortality: Includes both (1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days; and (2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure."

The STS Adult Cardiac Surgery Database also separately collects both in-hospital and 30-day mortality status and defines Operative Mortality as:

"(1) all deaths occurring during the acute episode of care in which the operation was performed (this includes patients transferred to other acute care facilities), even if after 30 days; and (2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure unless the cause of death is clearly unrelated to the operation."

The STS General Thoracic Database also reports both discharge mortality and 30 day mortality. In the STS General Thoracic Database Report, operative mortality is defined for the pulmonary resection model as "in hospital death or death within 30 days of surgery."

Defining the problem

Occasionally, 30-day mortality rates present definitional issues. For example, a patient who was alive at the start of the 30th postoperative day, but died later during the same day, can be considered to have been both alive and dead on the 30th day post procedure, a potentially serious inconsistency in interpretation.

In addition, the unit of measure of postoperative days has not been adequately defined and might be:

1. 24 hour increments of time after the operation, or

2. calendar days, beginning at midnight on the day of the operation or conceivably even the first day after the operation.

The Solution

STS recommends that the unit of measure of postoperative days should be calendar days beginning the first midnight after the patient enters the operating room. Using this strategy, the first postoperative day would be the day after the operation, which is how most surgeons currently count these days. Consider a patient who enters the operating room at 8 am, comes out of the operating room at 2 PM, and dies at 8 PM of the same day; this death occurs on postoperative day (POD) zero. Meanwhile, consider a patient who enters the operating room at 8 PM, leaves the operating room at 11:45 PM, and dies 30 minutes later at 12:15 AM; this death this occurs on POD 1.

To address issues related to these uncommon but important timing scenarios, STS has adopted the following clarifications of the aforementioned definitions:

1. *Mortality - Operative Death*

   Operative Mortality is defined as (1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days; and (2) all deaths occurring after discharge from the hospital, but *before the end of the thirtieth postoperative day*.

2. *Mortality - 30-Day Status*

   Indicate whether the patient was alive or dead *at the end of the 30th postoperative day* whether in hospital or not.

3. "*Date of Surgery*" is defined as the date of the data field "Time Patient Entered the OR", and

4. *Calendar days* are the unit of measure for postoperative days. Calendar days will begin and end at midnight in the time zone of the hospital where the patient had surgery. The first postoperative day will commence at the first midnight after the patient enters the operating room (the first calendar date after the date of the field of data "Time Patient Entered the OR").

This methodology may result in a patient emerging from the operating room on POD 1 (e.g. if their operation began at 11 PM and concluded at 2 AM). Situations such as this have generated considerable discussion in the past, as there was no clear Database documentation

on this issue. With the current clarification, such cases can now be accurately and consistently coded.

These new definitions also have implications for the measurement of postoperative length of stay (PLOS). Based on the rationale described above, PLOS is defined as the number of days from date of operation to date of discharge. By the new definitions, PLOS may be zero if the patient dies on the date of surgery, either in the operating room or immediately thereafter.

Accurate and consistent measurement of outcomes is a central pursuit of STS, and Operative Mortality is the single most important metric. The STS Database is increasingly used to measure quality [5, 6, 7] and document variation in outcomes [8, 9]; therefore, it is critical that definitions are precisely specified. With this clarification, one potential ambiguity in coding practices has been addressed.

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