

Editorial

Chart review: A blessing or a curse?

Neurological injury following cardiac surgery is a common complication that has a wide range of clinical presentations.¹ Patients can present with subtle cognitive defects that can only be detected by carefully conducted neuropsychiatric testing. In contrast, some patients experience serious neurological injuries that result in death or disability. Many of the injuries can have profound social and economic impacts, regardless of how successful the cardiac surgery is.²

A timely diagnosis of central nervous system injury following cardiac surgery requires a comprehensive and concise neurological evaluation. Any individual change in performance from baseline following surgery is an important clue that should prompt a full evaluation.³ A patient with clear consciousness before surgery should have an uneventful recovery following uncomplicated cardiac surgery. Delayed emergence after cardiac surgery may be an indication of neurological damage. Thus, it is important to differentiate patients and surgical variables that can lead to delayed emergence. However, there is a lack of studies that focus upon the identification and evaluation of risk factors for delayed emergence after cardiac surgery.

In this month's issue of the *Journal*, Tsai et al⁴ report a retrospective study to examine the association between specific variables and emergence time after cardiac surgery. Although this is an important and noble task, there are numerous of potential confounders that make a rigorous analysis impossible. Some of these issues include patient characteristics, surgical technique, anesthetic doses, and intraoperative cardiac events.

It is not an easy task to quantify all these factors or possible to include all imaginable confounders in a retrospective survey. The authors used a chart review to include as many potentially influential factors as they could in their study. Five risk factors of delayed emergence after cardiac surgery included old age, male gender, low body mass index, high preoperative blood urea nitrogen level, and prolonged cardiopulmonary bypass. Although the findings are interesting, there is an empirical quality to the study. The authors studied variables that have generally been associated with an increased risk of neurological injury. They were unable to determine what the predictive values of these factors were using their own data. Similar problems plague many retrospective studies. The precise identification of clinical correlations requires large databases or prospectively designed

studies. Even with these important limitations, the findings by Tsai et al⁴ may have potential implications in clinical practice. Additional studies will be required to test the validity of the initial findings.

Medical records contain large amounts of information and are, relatively, easily available for research purposes. Chart review is a commonly used method to generate original research data in medicine. It is retrospective in nature, because medical records are not gathered for research purposes even though they contain important clinical information. The main advantage of using medical records is that they already exist. This reduces the time and cost associated with performing a prospective trial. Other advantages include a large sample size. However, there is no guarantee whether the findings are representative and all retrospective studies should address this issue.⁵

Although a retrospective study may contain similar study-design elements as a prospective one, some investigators still regard retrospective studies as “quick and dirty” work because the data are not focused or directed to address specific questions. This makes it very challenging to validate the findings without additional studies. Despite these problems, a well-performed retrospective study is definitely neither “dirty” nor useless. It is well-known that retrospective studies allow study of rare occurrences and assessment of conditions with a long latency between exposure and outcome. Another particularly useful application of a retrospective study is as a pilot study before conducting a prospective one. The retrospective study is beneficial to focus the study question, clarify the hypothesis, determine an appropriate sample size, and identify feasibility issues for further prospective studies. It is interesting that there are no universally-accepted criteria for a “well-conducted” chart review. However, there are eight strategies that have been recommended to improve accuracy and minimize inconsistencies in medical chart review. These include training chart abstractors, precisely defining case selection criteria and collected variables, using standardized abstraction forms, holding periodic meetings to review the processes, monitoring the performance of abstractors, blinding chart reviewers to the tested hypotheses, and testing inter-rater agreement.⁶ All these efforts are intended to improve the validity, reproducibility, and overall quality of data collected from medical records.

Sørensen et al have also proposed seven influential factors to assess the value of secondary data. These include completeness

of registration of individuals, the accuracy and degree of completeness of the registered data, the size of the data source, the registration period, data accessibility, availability and cost, data format, and possibilities of linkage with other data sources.⁷ If the assessment of each of these factors is satisfactory, the data source may be of value to provide an initial evaluation of a research problem. This may direct the priorities for subsequent in-depth studies. However, it remains difficult to control bias and confounders even if all of the aforementioned rules are followed. One should keep in mind that the results from a retrospective study are, at best, hypothesis-generating, as it is difficult to establish cause and effect.

It is a blessing to be able to use existing data sources, particularly those with large amounts of information. To improve the study quality, evaluating the data source is necessary. Both investigators and readers should focus upon the potential problems inherent in data obtained from chart review processes. A retrospective investigation using chart review should have as high methodological standards as a prospective study.

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