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# A Review on the Advantages and Disadvantages of Using Administrative Data in Surgery Outcome Studies

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## Abstract

Administrative data is the information which is collected primarily for administrative purposes. In most cases this type of data is collected by government departments or other types of organizations for the purposes of registration, transaction and record keeping, usually during the delivery of a service. The use of administrative data in the field of surgery data has grown popular for measuring the specific results of a procedure, the results of a surgery performed in a large population, and for estimating health economic costs. Thus, in this mini-review we will try to summarize the advantages and disadvantages of using administrative data in surgery outcome studies. Thus, the primary advantage of administrative datasets comes from the fact that they are typically very large, covering samples of individuals and also time periods which are not achievable financially or logistically through any survey method. Beside cost saving advantage, the comprehensiveness of administrative data is often considered to be the one of the main advantage for research purposes. Other advantage that should be included here is that it may provide data on individuals which would not normally respond to surveys. As in the case of advantages, the disadvantages of administrative data are also listed as a contrast to the characteristics of survey data. The most important disadvantages are related to the reliability of administrative data for research purposes and the lack of adequate control variables. Also, the administrative data may be difficult to access because of confidentiality issues and because of bureaucratic issues in obtaining official approval. Furthermore, administrative data often lacks any documentation and information about the quality of the data.

**Keywords:** Medical database; Surgery; Administrative data; Follow-up; Survey

## Introduction

Administrative data is considered to be the information which is collected primarily for administrative purposes and not for research purposes. In most cases this type of data is collected by government departments or other types of organizations for the purposes of registration, transaction and record keeping, usually during the delivery of a service. The use of administrative data in the field of surgery data has grown popular for measuring the specific results of a procedure, the results of a surgery performed in a large population, and for estimating health economic costs. The use of this type of data is now allowing us to compare the results published by specific surgeons and those that occur in more large population samples. Furthermore, the use of administrative data analysis may help to find less commonly occurring outcomes that are found in larger populations, but are very difficult to quantify in smaller case series. Using administrative data may help defining the population risk level of adverse outcomes, such as complications after gastric bypass, but it shows clear limitation when we are trying to find the factors behind these outcomes [1].

The advantages and disadvantages of using administrative data in a study should be identified most easily comparing variant with the alternative of using survey data. The difference comes from how we formulate our hypothesis. The research hypotheses that are appropriately addressed for a use of administrative data are qualitatively different from those appropriately addressed by surveying a subset of the general population. Therefore, the particular question asked by the specific study should determine the type of data that one should use. For example, if an exhaustive study of a specific issue requires collected data from a population which is not included by the available administrative data or if important variables are missing; other data collection should be completed. Ideally, data from multiple sources should be used when we identify or rule out multiple potential causes of a particular phenomenon.

Few studies have examined the correlation between administrative data and survey data. A study compared information extracted from administrative databases collected for hospital billing purposes with specific clinical samples. No correlation of these data with that gathered from specifically designed clinical sources was found [2].

In other countries efforts are being made to raise the quality level of these administrative data. For example, in the United States, the STS National Cardiac Database has grown to include outcomes collected on more than 2 million patients from 60% of all cardiac surgery programs [2]. This data base is a voluntary registry but is continuously audited on many levels for completeness and accuracy and is generally accepted in the specialty field of cardiac surgery as the benchmark for clinical outcomes analysis [3]. Studies have shown that this administrative

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database correlated with the source data, the patient clinical hospital record. Results also showed that data are highly accurate for the reporting of major end points [4]. For example, the report of operative mortality was strongly correlated with source data, and there was an error rate of less than 1% for all major complications post-surgery [4].

The importance of finding advantages and disadvantages of using administrative data or clinical data in a study which measures an outcome of a medical operation, comes from the fact that using any statistical technique regardless of its sophistication, cannot compensate for flawed data, and it is the reason that motivates the present review. Administrative data is usually derived from discharge billing forms, and it is considered to be the most inexpensive and readily available source of information regarding hospitalizations outcome [3,5,6]. Although this type of data was not originally intended for this purpose, it is now used to assess healthcare provider performance [7,8].

## Administrative data advantages

The primary advantage of administrative datasets comes from the fact that they are typically very large, covering samples of individuals and also time periods which are not achievable financially or logistically through any survey method. Beside cost saving advantage, the comprehensiveness of administrative data is often considered to be the one of the main advantage for research purposes. Other advantage that should be included here is that it may provide data on individuals who would not normally respond to surveys.

The use of administrative data, in the surgery field, is superior to other data sources for identifying program participation (such as bariatric programs). In other words, using administrative data allows us to answer the following questions: what benefits were provided to whom, when, and in what amount. Other advantage may be in the fact that administrative data is collected on an entire population of individuals or families participating in a given program. This is allowing us to study low-incidence phenomena that may be expensive to uncover in a survey of the general population. Furthermore, this also makes it possible to analyze the spread of events over a geographical area. For example, the prevalence of obesity in certain areas, gender differences or how different cultures may influence the bariatric surgery outcome. In addition, given that information about events is usually collected in the actual moment when the event happened, there is a less probability for errors because of poor recollection.

Another important advantage for the use of administrative data is uncovering information that a survey respondent is unlikely to provide in an interview. It is expected that many patients will underreport the substance abuse, for example. Although survey methods have progressed significantly in addressing this kind of sensitive issues, administrative data can prove to be an accurate source of indicators for phenomena that are not easily reported by individuals, if this sensitive or confidential data can be accessed.

Administrative data may be also superior because the data record for an individual can be corrected and updated constantly. The value of this is even greater when the old information is maintained in addition to the updates. In this case, an exact history of the patients can be observed; his trajectory over time can be established. For example, for bariatric programs the weight fluctuations may help the specialists find the point in time in which a patient became obese. Further investigations can then be made to find the trigger behind the patient weight gain, possibly making assisting him in his weight loss program easier.

Therefore the main advantages of using administrative data in surgery outcome studies include: already collected data for operational purposes and therefore no additional costs of collection; the acquisition process is in no way intrusive to the target population; this type of databases are regularly and continuously updated; administrative databases can provide historical information and allow consistent time-series to be built up; they are collected in a consistent way because they are usually part of a national/local system; it covers near 100% of the target population; control groups can be created or selected post hoc; captures data of individuals who may not normally respond to surveys.

## Administrative data disadvantages

As in the case of advantages, the disadvantages of administrative data are also listed as a contrast to the characteristics of survey data. The most important disadvantages are related to the reliability of administrative data for research purposes and the lack of adequate control variables. Also, the administrative data may be difficult to access because of confidentiality issues and because of bureaucratic issues in obtaining official approval. Furthermore, administrative data often lacks any documentation and information about the quality of the data. Time must be spent by the researcher to find out qualitative information about the condition of the data. In addition, time must be also spent for understanding how the administrative data was collected, processed, and stored.

In addition, one possible disadvantage of using administrative data in surgery data in surgery outcome studies refers to the incorrect number of cases for analysis. This problem results from errors in diagnosis or procedure coding and from the use of software algorithms that cannot reliably identify isolated complications cases [9].

Other disadvantage is linked to the restricted study populations. These results are strictly based on only one group (health care patients for example), especially in studies based on administrative databases, which are not necessarily representative of overall program quality and may bias the results [10]. Therefore, the results of these studies should only be extrapolated to the population from the respective administrative database. For example, it is important that in surgery studies that use administrative hospital data, the final results to be considered representative only for the hospitalized population.

Furthermore, various problems are linked to the non-standardized mortality end points that are found in administrative data bases. This problem emerges from the fact that most administrative data registries record only in-hospital mortality, whereas clinical databases often record 30-day mortality. The additional statistical and clinical implications of non-standardized time of death intervals have been studied broadly in the literature [11].

In addition, misalignment of data sources with their original intended use is also an issue. Many administrative databases are created for claims benefits coordination. Therefore, coding practices and algorithms are developed for such reimbursement issues, not for clinical outcomes profiling in surgery outcome studies [12].

Perhaps the most important disadvantage is linked with the absence of some critical clinical variables. This is problematic especially in surgical studies which measure various outcomes after various surgical operations. It has been shown that much of the predictive power of these surgical risk models is derived from a limited number of critical clinical variables that sometimes are missing in administrative databases [7].

In the literature, it was found that complications and comorbidities are often confused in the administrative data. With administrative data, it is difficult to accurately code clinically relevant comorbidities or complications, to consistently capture all complications and comorbidities, and most important to distinguish comorbidities from complications [13].

Failure to distinguish complications from comorbidities leads to an exaggeration of risk models based on these administrative data. This bias comes from the inclusion of predictors in the risk model that are

actually late-hospitalization, pre-terminal events and therefore present a high predictive power of mortality [14,15].

Given all these disadvantages, several studies have failed to found a correlation between administrative databases and clinical ones. These studies showed differences in the outliers determined using administrative versus clinical data, even when they compared the clinical databases with relatively sophisticated administrative databases [16,17].

## Conclusion

Using the administrative databases in clinical studies on surgery outcomes can be used to reduce costs and to obtain a large sample of patients rapidly. To ensure that the results are not biased certain things can be done: the internal consistency of the data should be verified. It is important to understand how the data was collected and updated. If it is possible the data should be compared to any other available data sets through record linkage.

These ameliorations are required because hospital data records are still, for the most part, in their first generation of information systems. These systems are typically really old and do not take advantage of much of today's technology. In hospitals, front desk workers are typically not trained or do not have the time or resources to take on the data entry task. The modernization of hospitals correlated with the development of new graphical user interfaces is likely to have a positive effect on data entry and on the quality of administrative data bases.

### Conflict of interest

Authors have no conflict of interest to disclose.

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