

Discharge Data—Some Words of Caution

In the basement of every hospital there works a small army of coders, working late into the night converting clinical documentation into a digital format. Procedures and diagnoses are converted into discrete codes, using either the Current Procedural Terminology or the International Classification of Disease schemata. One of the many uses of these codes is the synthesis of a discharge abstract, which reports information including demographics (age, sex, race/ethnicity), insurance status, mechanism of entry into the hospital (emergency department admission, transfer, etc), and the procedures/diagnoses that were associated with each hospitalization. These abstracts are routinely analyzed at the state and regional level by administrators and those engaged in public health planning to estimate the population-based use of inpatient resources.

These data are also freely accessible at the national level through a program called the Healthcare Cost and Utilization Project. Through this program, interested parties can procure a 20% sample of annual domestic discharges (the Nationwide Inpatient Sample, or NIS) for a price as low as \$50 per year. As a research resource, the NIS is a powerful tool. The discharges that are included in the NIS are selected by use of a sampling scheme that is specifically designed to ensure that they represent the universe of domestic discharges. With some minor exceptions, the data are obtained and processed in a way that ensures consistency and uniformity. The sample size of the NIS is its greatest strength, however. Many hypotheses that could not be tested because of the small sample sizes inherent in a standard institutional/multi-institutional study are readily approached with use of the NIS.

As with any powerful tool, research with the NIS can be vulnerable to problems with technique and conception. A significant amount of skills are required simply to access the database and restrict the analysis to only those records of interest. An understanding of hierarchical statistics and multivariate logistic regression is also usually called for. The real skill, however, is in understanding the limitations

of the data and the extent to which they represent clinical phenomena. In analyzing any large database like the NIS, problems may arise as a result of issues relating to either *accuracy* or *bias*.

Issues with accuracy are intuitive, and pertinent to any analysis of secondary data. In a systematic review of studies that examined discharge coding accuracy within the United Kingdom, Campbell et al¹ found that inpatient procedures were coded correctly 53% to 100% of the time. For surgical hospitalizations, the accuracy appears to be higher, at greater than 95%.

Issues related to bias are more complicated and subtle. Consider a hypothetical study which finds (based on discharge data) that specialized surgeons had better outcomes with urgent/emergent operations than did nonspecialized surgeons. The following clinical phenomenon may exist: an emergent surgical case gets admitted in the middle of the night and gets operated on by the “nonspecialized” surgeon on call. Another patient (also a nonelective admission) is less urgent . . . this patient has an operation performed in the light of day by a “specialized” surgeon. To the extent that this occurs, the findings of such a study would be biased toward finding better outcomes in the hands of more specialized surgeons. Discharge data do not capture rich clinical data (eg, radiographic findings, presence of low-grade sepsis, duration of symptoms, etc) and so are poorly able to accurately stratify patients according to the severity of disease. If different types of surgeons are more likely to operate on patients with different severities of disease, then this is one (of many) source(s) of potential bias.

When analyzing a large database like the NIS, we are usually more concerned with issues related to bias than those related to accuracy. In general, inaccuracy that is truly random does not affect our findings, with the exception that all statistical tests are tilted toward the null hypothesis. Our effect sizes are *underestimated*. With bias, however, there is a greater danger—a biased study has the potential to make inferences and deliver conclusions that do not represent truth.

These problems with accuracy and bias are familiar to all experienced researchers. In dealing with secondary databases, however, there is another concept that deserves discussion—validity. The accuracy (and henceforth) the validity of procedure and diagnosis coding has been established in multiple studies, albeit not that well and not broadly enough. But what about other, more auxiliary

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variables—for example, surgeon identifier? Surgeon identifiers are attached to each hospitalization according to methods that vary from the hospital to the hospital and state to the state.² Most importantly, there has never been any systematic examination of the extent to which these identifiers consistently represent the surgeon responsible for the care provided during corresponding hospitalizations. The same concern could be raised regarding any variable in discharge data with unproven accuracy. Stated differently, discharge data with *unknown* accuracy has *questionable* validity.

In this issue of *Diseases of the Colon & Rectum*, Rea et al³ use NIS data to examine the outcomes and costs associated with elective colorectal resections as performed by “specialized” vs “nonspecialized” surgeons. Their findings reiterate that which has been widely published and *almost* accepted, that surgeons with higher volume and/or greater specialization of practice appear to have better outcomes within the focus of their specialty.⁴ The approach they have used has precedent—other authors have used NIS data to analyze the relationship between surgeon practice and outcomes.^{5–10} Despite this, it seems prudent to wonder how far to push analyses with limited administrative data. As more and more research is performed by surgeons using the NIS and related research resources, steps should be taken to ensure that our analyses and conclusions are firmly grounded, and that our reach does not exceed our grasp.

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