

Administrative Databases: Are They Useful for Clinical Analyses?

To the Editor:—We are pleased that Rosero *et al.*¹ pursued a study of the epidemiology of malignant hyperthermia (MH). We agree with Rosero *et al.* that reporting to the North American Malignant Hyperthermia Registry may underestimate MH mortality. From the Malignant Hyperthermia Association of the United States Hotline and the American Society of Anesthesiologists Closed Claims Project database we are aware of deaths clearly due to MH that were not reported to the Registry. Reports to the North American Malignant Hyperthermia Registry are voluntary, but provide key details that administrative databases cannot.^{2†} We encourage readers to report suspected MH episodes to the Registry, using forms that are available online at www.mhreg.org.

Rosero *et al.* define MH cases by the hospital discharge diagnosis code of malignant hyperthermia as a result of anesthetics, after excluding other conditions associated with hyperthermia. Did the authors attempt to confirm that the 2,312 MH cases not admitted from another health facility had been exposed to an anesthetic, for example by linking them to surgical or procedural International Classification of Disease, ninth revision (ICD-9) codes? The diagnosis of MH would be more certain if there was some evidence of anesthetic exposure, not just a code.

Like any database, the “output” depends on the accuracy of the data entered. The Nationwide Inpatient Sample depends on accurate coding by medical records departments, which in turn are dependent on clinical documentation. The diagnosis of MH requires no supporting evidence to be coded as such. Other studies have shown that incorrect coding and diagnostic inaccuracy can undermine calculations derived from administrative databases.^{3,4}

Rosero *et al.* conclude that the incidence of MH increased from 2000 to 2005. An equally plausible explanation is reporting bias: As coders became aware of the new ICD-9 code for MH, they used it more often.

† Publication list available at: www.mhreg.org. Accessed January 12, 2009.

This code (995.86) was approved in 1997, thanks to the efforts of the Malignant Hyperthermia Association of the United States and American Society of Anesthesiologists, and coders may have been unaware of its existence, given the rarity of MH.

Finally, we point out an error in Rosero *et al.*'s paper. The 2007 review by Rosenberg *et al.*⁵ did not consider our 2008 report of an MH-associated mortality rate of 1.4% to be “controversial.”² Their review was published almost a year before our paper, making it impossible to cite.

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(Accepted for publication April 23, 2009.)

In Reply:—We would like to thank Dr. Memtsoudis and Larach *et al.* for their comments regarding our study. We welcome the opportunity to address the criticisms and concerns expressed by these authors.

First, Dr. Memtsoudis speculates that our study may have overestimated the number of malignant hyperthermia (MH) episodes, because some patients with the diagnosis may have been transferred between hospitals. However, this possibility is unlikely. The National Inpatient Sample is a stratified probability sample of hospitals in the United States, and the sampling strata are based on five hospital characteristics (geographic region, urban or rural location, teaching status, bed size, and hospital control). Within each stratum, a particular hospital has a 0.2 probability of being selected in the database, which decreases the chances of an MH case being captured multiple times in the database. We feel that this low probability decreases the chances of an MH case being captured multiple times in the database and, therefore, disagree that interhospital transfers may have impacted our estimates in any substantial way. Furthermore, information about vital status of patients at discharge (whether or not they died during hospitalization) is quite accurate in the National Inpatient Sample, and is not affected by transfers between facilities. Thus, if the incidence of MH was lower than that reported in our study, then the mortality rate from MH would be even higher than we

found, leading to the same conclusion that current mortality from MH in the United States is higher than that previously reported.

We attempted to address the concern raised by Dr. Memtsoudis regarding the use of weighted or unweighted data in our manuscript, where we stated that our results were based on weighted analyses of the database, taking into account the sampling design of the National Inpatient Sample and using the statistical tools available for the analysis of stratified samples. Finally, we agree with the limitations raised by Dr. Memtsoudis related to the administrative nature of the NIS database, and discussed them in our manuscript. Nevertheless, the benefits of using such databases are well recognized and should not be overlooked.

The main concern of Larach *et al.* is that our study may have included a significant number of cases erroneously coded as MH episodes. We acknowledge that case ascertainment is a major source of bias in studies using administrative databases. Accordingly, we excluded patients with diagnosis codes of other conditions associated with hyperthermia. While we may have missed some cases, we eliminated many that were most likely miscoded. However, given that information to confirm the diagnosis of MH and the type of anesthesia are not available in the database, our study has still a potential for overreporting. Although the median age of our sample was only 39 yr and more than 90% of the patients had a low comorbidity index, we