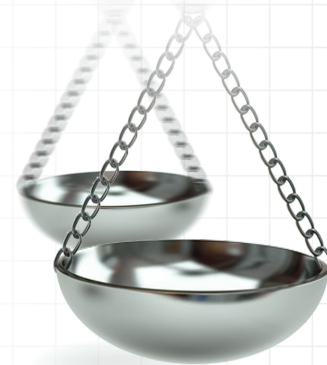




# Data limitations of administrative databases in examining healthcare disparities in anesthesiology

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**“The use of readily accessible information from national administrative databases has allowed researchers to examine healthcare disparities in anesthesiology.”**

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As the USA population becomes increasingly complex and diverse, greater efforts are needed to identify healthcare disparities and the inequities that drive them [1]. Yet, despite the implementation of policies such as the Healthcare Research and Quality Act of 1999 [2] to address gaps in healthcare delivery over the past several decades, data limitations continue to present significant barriers to identifying and addressing healthcare disparities on a community, state and national level. Efforts to assess determinants of health as confounders and effect modifiers of health outcomes are hindered by inadequate or small sample sizes (inadequate statistical power, precluding use of interaction or stratified models), measurement errors, missing data and lack of information on contributing factors such as socioeconomic, cultural and environmental variables [3]. These limitations are relevant and pervasive across large-scale administrative databases that are used in anesthesiology to investigate disparities in anesthesia care and management as well as perioperative risks and outcomes. Herein, we briefly discuss some data challenges that arise when using several common national databases to examine healthcare disparities in anesthesiology.

The National Anesthesia Clinical Outcomes Registry (NACOR) is a data warehouse developed by the Anesthesia Quality Institute containing data from participating groups on patient demographics, provider characteristics, pre-operative risk factors and intra-operative variables [4]. A recent study using NACOR data found that patients from lower socioeconomic backgrounds (operationalized by insurance status or median income) received significantly less antiemetics compared with those from higher socioeconomic backgrounds, raising concerns that disadvantaged patients may receive inferior anesthesia care [5]. Additional markers of socioeconomic status such as education attainment, social support and food and healthcare accessibility are not recorded in NACOR and therefore could not be examined. Race and ethnicity, a key variable for identifying healthcare disparities among heterogeneous subgroups, is also not collected by NACOR, hindering potential analysis of the relationships underlying racial and ethnic disparities. Moreover, as with any administrative database, missing, incomplete or misclassified data points in NACOR may generally contribute to imprecise measurement of disparities in anesthesia care.

The Multicenter Perioperative Outcomes Group (MPOG) is a registry of electronic health records and administrative data of anesthesia care performed during surgical and diagnostic procedures. The MPOG database contains 11 million cases from more than 50 hospitals throughout the USA (18 states) and the Netherlands and provides information relevant to patient comorbidities, surgical procedure, perioperative management, interventions performed and postoperative outcomes [6]. A preliminary retrospective analysis of MPOG data demonstrated that Black patients were significantly less likely to receive antiemetic prophylaxis compared with White patients even after controlling for relevant patient, hospital and procedure-level factors [7]. Due to limited availability of patient demographics in MPOG, however, the impact of socioeconomic status, education attainment, income and their intersectionality with race and ethnicity could not be examined. Anesthesiology provider characteristics such

as race and ethnicity, gender or age, which might influence behavior, are also unavailable in MPOG. Similar to many administrative healthcare databases, MPOG reports limited race and ethnicity categories as Black, White, other and unknown; reporting as such is not in accordance with the 1997 Office of Management and Budget (OMB) guidelines (American Indian or Alaska Native; Asian; Native Hawaiian or other Pacific Islander; Black; White; Hispanic ethnicity; and the option to report more than one race) [3,8]. A lack of comprehensive race and ethnicity information poses a challenge for researchers to reliably estimate access and quality measures for specific subpopulations and communities. Moreover, with the growing heterogeneity of the USA population, many people may not identify with any of the OMB racial and ethnic categories, resulting in measurement errors and an increased need for collection of more precise and uniform race and ethnicity data across databases.

The Healthcare Cost and Utilization Project (HCUP) is a family of state and national healthcare databases sponsored by the Agency for Healthcare Research and Quality and includes the largest collection of publicly available longitudinal hospital care data in the USA [9].

Within the HCUP family is the State Inpatient Databases (SID) which contains approximately 97% of all hospital discharges in the USA and provides a range of state-specific clinical and nonclinical data, including patient and hospital-level characteristics, diagnosis and procedure codes, admission and discharges dates and total hospital charges [9]. HCUP data and specifically SID data, have been extensively used to examine social determinants of health and document racial/ethnic and socioeconomic disparities in mortality, perioperative complications and readmission rates following a range of surgical procedures [10–14]. Anesthesia type information in the SID, however, is only available in New York State, restricting analysis to a small sample cohort and limiting the ability of researchers to measure and assess potential variations in anesthesia care between states. Information on provider implicit bias, institutional practices and other factors influencing choice of anesthesia are also not included in the SID and are generally not measured and reported in healthcare databases, impeding efforts to identify and address disparities through individual- and organization-level interventions.

The Premier Healthcare Database (PHD) is a privately maintained discharge-level registry of over 1000 nonfederal hospitals, representing approximately 25% of annual inpatient admissions in the USA [15]. The PHD contains information on patient demographics and disease states, costs of billed services, admitting and attending physician specialties and hospital characteristics. Studies using this database have found that Black patients undergoing radical nephrectomy experience a markedly elevated rate of complications compared with White patients and that older, Black and Hispanic (versus White) [16] and publicly insured and uninsured patients (versus commercially insured patients) are less likely to receive neuraxial anesthesia and peripheral nerve block for orthopedic procedures [17]. Similar to other administrative databases, the PHD database is limited by missing or incomplete data, potential coding bias and lack of a comprehensive list of clinical detail and confounding factors.

The use of readily accessible information from national administrative databases has allowed researchers to examine healthcare disparities in anesthesiology. However, data limitations exist when using such databases, including missing data, inadequate data on race and ethnicity and lack of information on social determinants of health among many others. Assessing the interactive effects of multiple determinants of health, including individual characteristics, is necessary to identify not only healthcare disparities but also the inequities driving them and to facilitate the development of targeted interventions and policies to address these gaps in healthcare. It is, therefore, critical that researchers and collaborators are aware of data limitations when identifying appropriate healthcare databases that contain sufficient statistical power and measures of interest. Likewise, although collection of a wide range of factors poses great challenge and not all factors are easily measurable, greater investment and focus is needed to standardize the inclusion of healthcare disparity-relevant data points in administrative databases.

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