Increased maternal morbidity and mortality among Asian American and Pacific Islander women in the military health system

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Patrizia C. Grob, DO; Rachel R. Tindal, MD; Kathleen R. Lundeberg, DO; Jameaka L. Hamilton, MD; Veronica M. Gonzalez-Brown, MD; Erin A. Keyser, MD

BACKGROUND: Rates of maternal morbidity and mortality experienced by women in the United States have been shown to vary significantly by race, most commonly attributed to differences in access to healthcare and socioeconomic status. Recent data showed that Asian Pacific Islanders have the highest rate of maternal morbidity despite having a higher socioeconomic status. In the military, women of all races are granted equal access to healthcare, irrespective of socioeconomic class. We hypothesized that within the military, there would be no racial disparities in maternal outcomes because of universal healthcare.

OBJECTIVE: This study aimed to evaluate if universal access to healthcare, as seen in the military healthcare system, leads to similar rates of maternal morbidity regardless of racial or ethnic background.

STUDY DESIGN: This was a retrospective cohort study of data from the National Perinatal Information Center reports obtained from participating military treatment facilities from April 2019 to March 2020 and included 34,025 deliveries. We compared racial differences in the incidence of each of the following 3 outcomes: postpartum hemorrhage, severe maternal morbidity among women with postpartum hemorrhage including transfusion, and severe maternal morbidity among women with postpartum hemorrhage excluding transfusion.

RESULTS: A total of 41 military treatment facilities (a list of participating military treatment facilities are provided in the Appendix) provided data that were included. There was an increased rate of postpartum hemorrhage (relative risk, 1.73; 95% confidence interval, 1.45−2.07), severe maternal morbidity including transfusion (relative risk, 1.22; 95% confidence interval, 0.93−1.61), and severe maternal morbidity excluding transfusion (relative risk, 1.97; 95% confidence interval, 1.02−3.8) among Asian Pacific Islander women when compared with Black or White women.

CONCLUSION: Even with equal access to healthcare in the military, Asian Pacific Islander women experience statistically significant increased rates of postpartum hemorrhage and severe maternal morbidity excluding transfusion when compared with Black or White women. The increased rates of severe maternal morbidity including transfusion were not statistically significant.

Key words: Asian Pacific Islander, maternal morbidity and mortality, military health system, postpartum hemorrhage, racial disparities, severe maternal morbidity, socioeconomic status

AJOG MFM at a Glance

Why was this study conducted?

This study was conducted to determine if universal healthcare, as seen in the military healthcare system, would lead to similar rates of maternal morbidity among women with different racial and ethnic backgrounds.

Key findings

It was determined that even with equal access to healthcare in the military, there continues to be racial disparities in terms of maternal morbidity. This indicates that there are additional factors, such as implicit bias or systemic racism, that are contributing to this racial disparity.

What does this add to what is known?

This study adds to the continued research on racial disparities seen in maternal morbidity. This study also included Asian Pacific Islander as a separate racial category.

Introduction

The rate of maternal morbidity and mortality have increased steadily in the United States with the Center for Disease Control and Prevention (CDC) reporting a rate of 7.2 deaths per 100,000 live births in 1987 compared with 17.3 deaths per 100,000 live births in 2017.[1] Of these incidents, the CDC reported that 60% of maternal mortality is preventable.[2] This increase in maternal morbidity and mortality continues despite advancement in overall patient care and treatment. When comparing the United States with other developed countries, the United States has almost double the rate of maternal mortality than other countries with Norway, the Netherlands, and New Zealand reporting a rate of only ≤3 deaths per 100,000 live births.[3]

In the United States, it has been shown that the rates of maternal morbidity and mortality vary significantly by race.[4] The 2019 CDC study in which maternal mortality was investigated determined that non-Hispanic Black women have a 2.5 times higher rate of maternal mortality than non-Hispanic White women.[4] With the CDC Pregnancy Mortality Surveillance System, major causes of maternal mortality were investigated and it was found that postpartum hemorrhage (PPH), defined as blood loss of ≥1000 mL, accompanied by signs and symptoms of hypovolemia within 24 hours of delivery,

accounted for approximately 11% of all maternal deaths.[2] Non-Hispanic Black women were found to have a higher risk for maternal mortality related to PPH.[5] This disparity is most commonly attributed to differences in the access to healthcare and in socioeconomic status.[4] Even though the population of Asian Pacific Islanders (APIs) continues to be one of the fastest growing racial groups in the United States, they are often excluded from studies looking at maternal outcomes.[6,7] Studies that have included API as a separate race showed that women who identify as API have the highest rate of maternal morbidity, including higher rates of PPH, acute end-organ damage, and mortality during hospitalization for delivery.[7] This difference in outcomes persists although APIs live in areas of higher socioeconomic status and are more likely to have private insurance.[6]

In the United States military, women of all races are granted equal access to universal healthcare, irrespective of socioeconomic class. Medical healthcare coverage extends to all eligible active-duty personnel, retirees, and dependents. This provides a unique opportunity to analyze maternal outcomes when there is equal access to healthcare. We hypothesized that within the military healthcare system, there would be no racial disparities in maternal outcomes because of universal healthcare.

Materials and Methods

A retrospective cohort study design was used to analyze data from the National Perinatal Information Center (NPIC) report for participating military treatment facilities (MTFs) from April 2019 to March 2020. Institutional review board approval was obtained. The NPIC is a nonprofit organization that collects perinatal data from enrolled civilian hospitals and MTFs across the country. These data allow for the comparison of perinatal data among hospitals across the country. We specifically looked at the data from 41 MTFs enrolled in the NPIC that contributed a total of 36,861 deliveries. The MTFs were further categorized as either high, medium, or low volume. High volume was defined as MTFs with ≥1000 deliveries per year, medium volume was defined as having 500 to 999 deliveries per year, and low volume facilities had <500 deliveries per year.

This analysis was conducted with use of the open-source software R (R Core Team, Vienna, Austria) with the epitools package, and the figures were created using the ggplot2 package.[8−10] Using a chi-square analysis, we compared racial differences in percentages in each of the following 3 categories: PPH, severe maternal morbidity (SMM) among women with PPH with inclusion of transfusion, and SMM among women with PPH with exclusion of transfusion. For this data set, PPH was defined as a cumulative blood loss of ≥1000 mL of blood accompanied by signs and symptoms of hypovolemia within 24 hours following the birth process.[11] PPH with or without transfusion refers to whether the patient received a blood transfusion or not. Lastly, the definition of SMM was based on the CDC criteria, which is based on 21 indicators with corresponding International Classification of Diseases (ICD) diagnosis and procedure codes used to identify delivery hospitalizations with SMM.[12]

The self-identified races within the NPIC data included White (Europe, the Middle East, or North Africa), Black (Black racial groups of Africa), Asian or Pacific Islander (Far East, Southeast Asia, or the Indian subcontinent

including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam or a person with origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands), Alaskan Native o American Indian, and other (any race that does not fit into the above categories, including patients with multiple races).
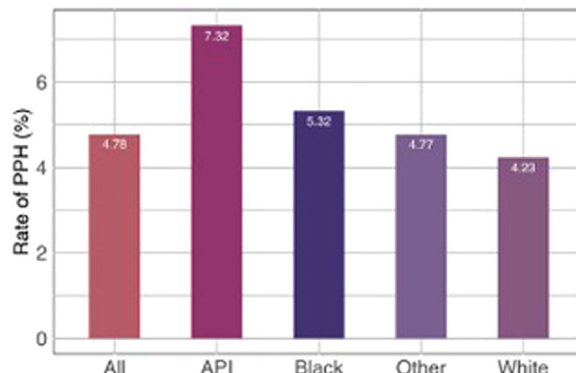
Results

During the study period in which the data were collected, a total of 36,861 deliveries were reported for the 41 MTFs included in the study. Of the 36,861 deliveries, 17,598 were reported as White, 5169 as Black, 1777 as API, and 10,379 as other. The Alaskan Native and American Indian (AN/AI) group was excluded from analysis because there were only 108 deliveries reported for this category. Of the 41 MTFs, 20 MTFs fell into the low volume category with 15.5% of deliveries reported at these locations, 7 MTFs qualified as medium volume with 15.2% of deliveries reported there, and 14 MTFs qualified as high volume with 69.3% of deliveries reported there.

A total of 1761 women experienced PPH; of those, 744 were reported as White, 275 as Black, 130 as API, and 495 as other. For SMM including transfusion, there were 531 reported cases with 201 identifying as White, 81 as Black, 43 as API, and 177 as other patients. Lastly, there were a total of 93 cases of SMM excluding transfusion of which 32 (4.3%) identified as White, 14 (5.09%) as Black, 11 (8.46%) as API, and 30 (6.06%) as other.

Of those women who experienced PPH, there was a statistically significant increased rate of PPH (relative risk [RR], 1.73; 95% confidence interval [CI], 1.45−2.07) among API women when compared with Black or White women. Among API women, there was also a statistically significant increased rate of SMM excluding transfusion (RR, 1.97; 95% CI, 1.02−3.8) when compared with Black or White women. Although there was an increased rate of SMM including transfusion (RR, 1.22; 95% CI, 0.93−1.61) among API women, this

was not found to be statistically significant. These results can be seen in Figures 1 to 4 below.
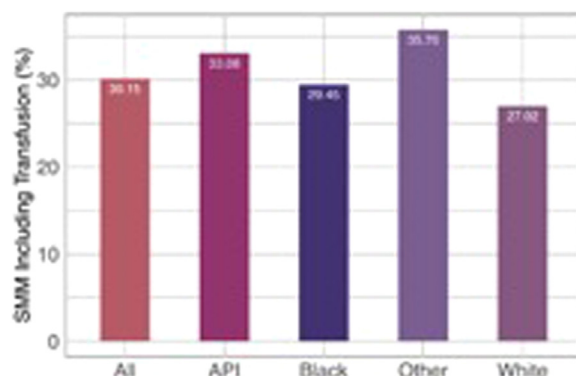
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We hypothesized that in the United States military healthcare system, there would be no difference in the maternal outcomes among different races because of universal access to healthcare provided by the military health system. Our hypothesis was not supported by the data, which showed that there was significant racial disparity in adverse maternal outcomes even within the military health system. The rates of PPH and SMM excluding transfusion were statistically significantly higher among API women than among women of White, Black, or other race. This is unexpected because one of the leading theories to explain racial disparities in maternal outcomes is access to healthcare.

Although there is previous research that evaluated maternal outcomes in the active-duty military population, there are no current studies that included API as a separate race in the data set.[13] It is worthwhile to mention that previous research also found racial disparities in maternal outcomes within the military population when comparing Black and White women. This included increased rates of cesarean delivery, adult intensive care unit admission, and SMM for Black women.[13] Other strengths of this study include that the data were from

API, Asian Pacific Islander; *MTF*, military treatment facility; *NPIC*, National Perinatal Information Center; *PPH*, postpartum hemorrhage.
Grob. Maternal morbidity in the military health system. Am J Obstet Gynecol Glob Rep 2023.

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FIGURE 3
Rate of SMM among women with PPH excluding transfusions
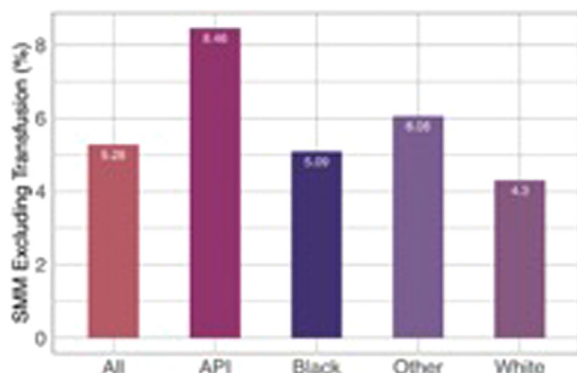
API, Asian Pacific Islander; *MTF*, military treatment facility; *NPIC*, National Perinatal Information Center; *PPH*, postpartum hemorrhage; *SMM*, severe maternal morbidity.

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all 3 military branches (Air Force, Army, Navy) and that the NPIC data set was validated before inclusion into the data base.

Limitations of this study include that race was self-reported and APIs comprised only 4.8% of the cohort reported in the NPIC data set. The category of API in this data set was very broad and included patients from the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam and people with origins in any of the original people of Hawaii, Guam, Samoa, or other Pacific Islands. With so few patients included in the API data set and so many countries and regions included, the implications of this finding are limited. Another limitation of this study is the lack of demographic data such as annual income, military rank (officer vs enlisted), and level of education. Because of the de-identified nature of the data set, the only demographic information available was self-identified race and ethnicity.

Although the data set included MTFs with low-, medium-, and high-volume deliveries, almost half the MTFs included in the data set qualified as low-volume MTFs. This is a limitation because these healthcare facilities had <500 deliveries per year, whereas only 14 MTFs included in the data set had >1000 deliveries per year. Facilities with less deliveries could account for more adverse outcomes because staff are completing less procedures per year and have less patient care experience and because smaller MTFs tend to have less resources available such as transfusion products or on-site anesthesia. Although all 41 MTFs had the Alliance for Innovation Maternal Health hemorrhage bundles in place during the study time frame, future research needs to be completed to investigate available resources (subspecialist, transfusion products, anesthesia) and patient outcome.

Future studies should separate the API category into more individual categories. In addition, 28% of the patients were self-reported as other for race, which makes it difficult to accurately compare data among different races. The data for this research was for a period of 12 months, and for future research, it would be valuable to analyze data over collected over a 5- or 10-year period to look at trends over periods of time.

Although the military provides equal access to healthcare for all active-duty members, dependents, and retirees, there could still be barriers to access to care. This includes significant pay differences between enlisted and officers, differences in education level, and differences in the quality of healthcare available at various duty stations. Another factor that could contribute to the racial disparity in adverse maternal outcomes is possible genetic susceptibility. This requires further investigation and research. In conclusion, it is necessary to look into further causes of this maternal healthcare disparity within the military health system. ∎

FIGURE 4
Risk of PPH and SMM including and excluding transfusions of API women using White women as reference range
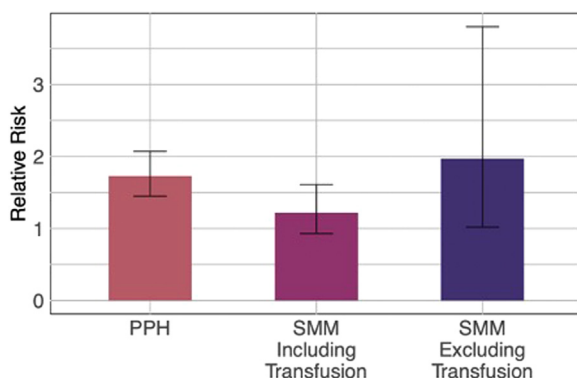
API, Asian Pacific Islander; *PPH*, postpartum hemorrhage; *SMM*, severe maternal morbidity.

Grob. Maternal morbidity in the military health system. Am J Obstet Gynecol Glob Rep 2023.

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