Black women hospitalized in US with blood infection resistant to last-resort antibiotic at increased risk of death

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New research being presented at this year's ESCIMD Global Congress (formerly ECCMID) in Barcelona, Spain (27–30 April), finds that the odds of death in Black women with a bloodstream infection (BSI) caused by carbapenem-resistant enterobacterales (CRE)—a family of the world's most intractable drug-resistant bacteria—was twice that of Black men or White women even after adjusting for age, BSI source, liver disease, hospital onset, race and gender and the race-gender interaction.

"These findings are deeply troubling," says lead author Dr. Felicia Ruffin from Duke University School of Medicine in Durham, North Carolina, U.S. "Studies are rare that describe these disparities, and our analyses found that it is being both female and Black that is associated with an increased risk of dying."

"Our study did not address the reasons for these disparities, but differences in comorbid conditions affecting the immune response emerged as a possibility for the differences in the outcomes. Additional research is needed to uncover the social determinants of health outcomes.

"Barriers to access to medical care, socioeconomic status, differences in antibiotic use, and health literacy about antimicrobial-resistance (AMR) may also contribute to these disparities, all of which can be associated with racial and biological sex inequities."

The US Centers for Disease Control and Prevention (CDC) estimates that 2.8 million people become infected each year with antibiotic-resistant bacteria, resulting in at least 35,000 deaths. Enterobacterales are the largest group of disease-causing bacteria in humans.

Carbapenem-resistant Enterobacterales (CREs) are resistant to

commonly prescribed antibiotics called carbapenems, which are considered the drugs of last resort for treating severe infections. In the U.S., about 2–3% of Enterobacterales associated with health care infections are resistant to carbapenems.

Infections caused by these organisms are associated with high death rates among hospitalized patients, up to 50% in some studies. However, the relationships between race and sex on clinical outcomes after bloodstream infections caused by CREs are not known.

To find out more, researchers examined data from 362 patients treated at 29 US hospitals in 17 states including the District of Columbia (DC)for bloodstream infections caused by CDC-defined CRE (in vitro resistance to one or more carbapenems—including ertapenem—without any requirement for cephalosporin resistance) between April 2016 and November 2019.

All patients were enrolled in the CRACKLE-2 study (the second Consortium on Resistance Against Carbapenems in Klebsiella and other Enterobacteriaceae)—a prospective, multicentre, cohort study with consecutive enrollment of hospitalized patients.

Of the 362 patients (aged 49 to 71 years) included in the study, 117 (32%) were Black, and 60 (17%) were Black women; 245 (68%) were White, and 104 (29%) were White women.

Black patients were more likely to be admitted to the hospital from long-term care facilities (32% vs. 20%), to have peripheral vascular (17% vs. 6%) or cerebrovascular disease (26% vs. 12%), and to be hemodialysis dependent (17% vs. 8%). White patients had higher rates of liver disease (17% vs. 7%) and cancers (39% vs. 16%).

Researchers analyzed whether race, sex, and the interaction of race and

sex, and clinical variables were associated with 30-day mortality.

Prior studies have shown that the 30-day mortality rate after CRE bloodstream infections was between 24% to almost 50%. In this cohort, the overall 30-day mortality rate from any cause in the entire cohort was 28% (101/362). This included 35% (21/60) of Black female patients and 23% (24/104) of White female patients, and 18% (10/57) of Black male patients and 33% (46/141) of White male patients.

After adjusting for potential confounders, including age, bloodstream infection source, liver disease, and hospital-onset, the analysis found that race and sex were not individually associated with 30-day mortality. However, the interaction between race and sex was found to be an independent predictor of 30-day mortality.

Specifically, Black female patients had higher odds of death within 30 days compared to White female patients (2.15 times increased risk) and Black male patients (2.59 times increased risk). Trends towards increased mortality were also observed in White males compared with White females and Black males, but these were not statistically significant after accounting for other differences between patients.

Dr. Ruffin says, "Our findings that Black women experience higher mortality after (CRE) bloodstream infections compared with White women and Black men illustrates the importance of combining race and sex when evaluating racial and sex-related disparities in infectious disease outcomes in future studies."

"The distribution of comorbid conditions was different between Black and White patients and may contribute to disparities. The root causes of disparities in AMR infections will require larger sample sizes and more in-depth analyses of the sources of infection in patient groups. Interventions are needed that address the management of comorbidities

that increase patients' risk for infection."

The authors note several study limitations, including a focus on Black and white patients to the exclusion of other racial and ethnic groups, and the observational nature of the study, which may have missed other contributory factors. They also note that the study did not address the social determinants of health, so the results are unable to attribute causation.

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